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THE MEAN OBSERVED METEOROLOGICAL  
STRUCTURE AND CIRCULATION OF THE  
STRATOSPHERE AND MESOSPHERE

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16. Abstract  <p>Since 1960, over 200 meteorological soundings of the upper stratosphere and mesosphere have been conducted with <i>in situ</i> rocket techniques during all seasons of the year from several sites ranging in latitude from 8° S to 71° N. The resulting data which have been compiled into mean monthly and seasonal profiles of temperature, pressure, density, and wind for each site are presented here in both graphic and tabular form. Analyses of these mean values have been performed to produce time and quasi-meridional cross sections and constant level maps which are also included.</p>					
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# THE MEAN OBSERVED METEOROLOGICAL STRUCTURE AND CIRCULATION OF THE STRATOSPHERE AND MESOSPHERE

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## INTRODUCTION

The Meteorological Sounding Rocket Program at Goddard Space Flight Center has conducted *in situ* measurements of the meteorological parameters of the atmosphere since 1960 in a systematic effort intended to define and better understand the physics and meteorology of the atmosphere in the altitude region between approximately 35 and 100 km. The atmosphere above 50 km is relatively inaccessible except to high performance sounding rockets, and their rapid passage through the region of interest requires such sophisticated sensing methods as the acoustic grenade and pitot probe techniques, rather than immersion thermometry to measure ambient temperature, for example. Since these techniques involve more complex experimental hardware and data processing to obtain results, the number of soundings that can be conducted is limited by economic considerations. Thus, the mean profiles and analyses included in this report are based upon 227 soundings, a relatively small sample compared to the data available at lower levels. Nevertheless, the soundings compiled here represent the largest body of data for which the techniques, quality control, and data processing have been consistent over a 10 year period of time.

The standard atmosphere models, such as the "COSPAR International Reference Atmosphere", (Reference 1), the "U.S. Standard Atmosphere, 1962" (Reference 2), and the "U.S. Standard Atmosphere Supplements, 1966" (Reference 3), are based on the observations which were available prior to 1966. Additional data are now available, and the existing techniques for observing the meteorological structure of the mesosphere have been improved upon, revealing some differences with and filling some voids in these model atmospheres. All model atmospheres have minute detail removed from their structure, but oversimplification by smoothing can also compromise the usefulness of the model. Hopefully, the compilation of statistical means produces realistic values of the atmospheric parameters,

provided the sample is a representative one. The purpose of this report is to compile a climatology of observed values of temperature, pressure, density, and wind at various sites during all seasons which will update and supplement the standard models to provide realistic inputs for computations involving neutral and ion composition, energy deposition and propagation, transport processes, and design considerations for spacecraft reentry.

## SOUNDINGS

As mentioned in the foregoing section, two methods were employed to obtain the data: the acoustic grenade technique (Reference 4) was used to measure profiles of temperature and horizontal wind, which permitted the derivation of pressure and density profiles, and the pitot probe technique (Reference 5) was used to measure profiles of density, which permitted the derivation of temperature and pressure profiles. Of the 227 soundings included in this report, 207 were grenade soundings, and the remainder were pitot soundings. Complete tabulations of the individual soundings are published in References 6, 7, 8, 9, 10, 11, and 12.

The acoustic grenade technique averages inherently the temperature and wind over layers between adjacent grenade explosions which are typically 2 to 4 km in thickness. The pitot probe technique, however, produces density profiles which have a vertical resolution of 0.5 km. The technical details of these techniques and the errors associated with them are published in the references already cited and will not be repeated here.

The mean profiles given here include soundings carried out from five sites which covered a wide range of geographical latitudes during all seasons. The launch sites included Natal, Brazil ( $6^{\circ}$  S), and Ascension Island ( $8^{\circ}$  S), which were combined to represent a tropical regime; Wallops Island, Virginia, United States ( $38^{\circ}$  N), representing a temperate regime; Churchill, Manitoba, Canada ( $59^{\circ}$  N), representing a subarctic regime; and Point Barrow, Alaska, United States ( $71^{\circ}$  N), representing an arctic regime. The soundings were fairly well distributed throughout the year, as well as the diurnal cycle, as shown by the distributions given in Figures 1(a) and 1(b). Ideally, these distributions would be uniform, but the soundings were conducted over the years to satisfy various objectives, with climatological ones low in priority.

No attempt has been made to remove the tidal components from the data because of the uncertainties involved in the theory. Variations produced by relatively short term phenomena ranging from gravity waves to synoptic scale eddies tend to be removed by the averaging process when monthly and seasonal means are computed. Gravity wave and tidal phenomena are believed to be responsible for very large amplitude fluctuations observed in the structure of the upper atmosphere in certain cases; however, the averaging procedure appears to remove these short term changes from the mean profiles effectively. This is indicated by the coherent geostrophic analyses which result from the mean wind and pressure values at all but the highest altitudes. Were the short term fluctuations not removed, their ageostrophic contributions would make such analyses impossible.

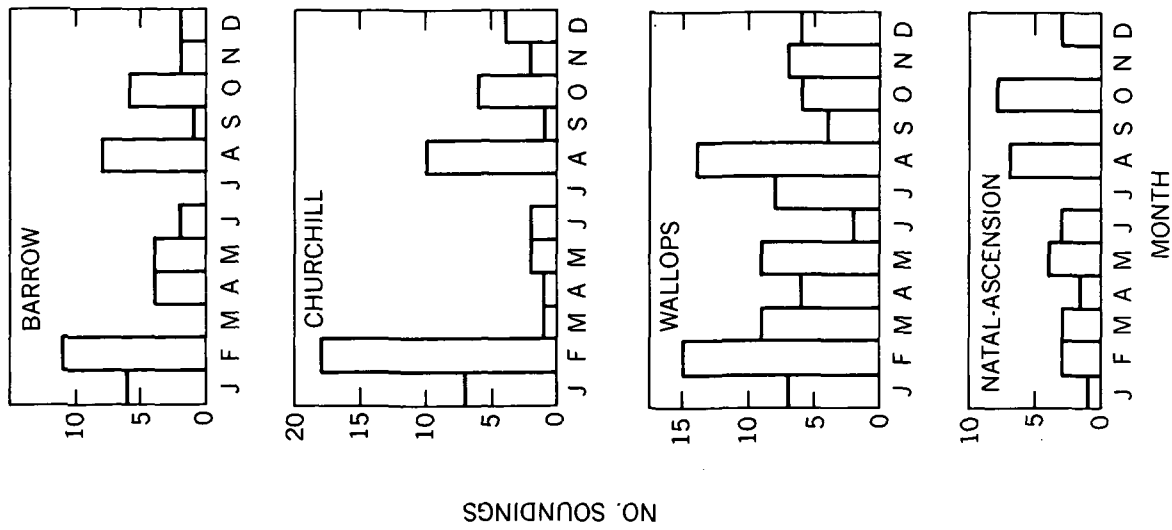


Figure 1(a)—The monthly distribution of the soundings for each site.

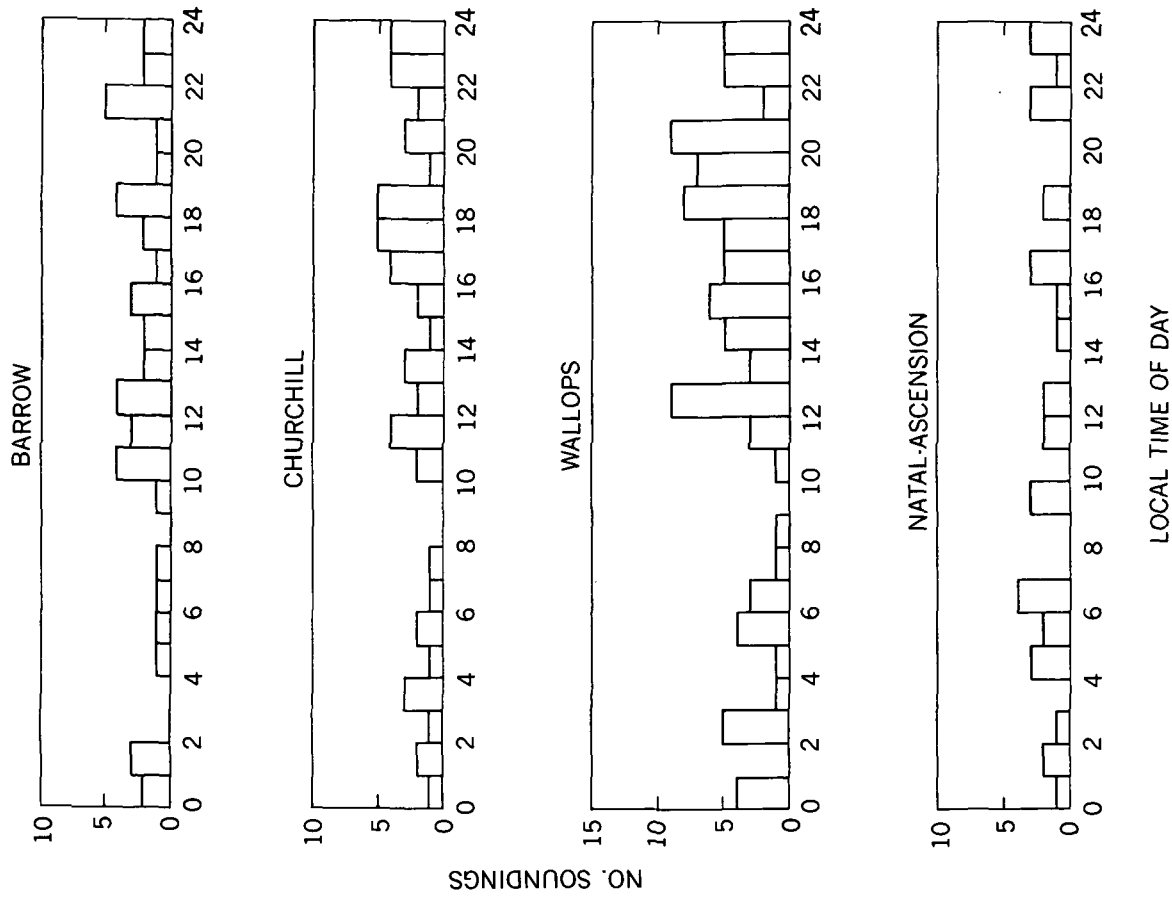


Figure 1(b)—The hourly distribution of the soundings for each site.

## PRESENTATION OF THE DATA

The relatively small number of soundings available has made it necessary to combine the monthly data into seasonal means. Therefore, those soundings conducted in December, January, and February were averaged to produce a mean winter model; those soundings conducted in June, July, and August were averaged to produce a mean summer model; and those conducted in March, April, May, September, October, and November were averaged to produce a mean spring/fall, or transition, model for the sites Wallops Island, Churchill, and Barrow. Since only a very small seasonal dependence was detected in the Natal-Ascension soundings, the data for all months were averaged together to produce a mean annual model. The numbers of soundings and the months included in each model are listed in Table 1. The annual and seasonal mean profiles are tabulated in Appendixes A and B. Tables A.1 through A.4 present the temperature, pressure, and density data as compared with values from "U.S. Standard Atmosphere, 1962", and Tables B.1 through B.4 present the same results compared with values from the "U.S. Standard Atmosphere Supplements, 1966".

The models consist of tabulations of mean temperature, mean pressure, and mean density at 1 km intervals along with the standard deviations of these mean values and their percent difference from values in "U.S. Standard Atmosphere, 1962". The number of observations included at each level is tabulated at the right. This number refers to the number of times that the parameters were observed (or derived from an observation) at that altitude.

Rather than interpolating values at 1 km altitude intervals as was done for the thermodynamic structure, the winds were taken from the grenade soundings at their observed altitudes and grouped into layers 5 km thick. All the wind observations within each layer were averaged with equal weight to produce the mean and the standard deviation for that layer. The mean for each layer is listed by the altitude of the lower boundary of the layer for convenience. For example, the mean listed at 40 km is actually the mean for the 40 to 45 km layer. In the curves of the mean wind profiles, the averages for the layers are plotted at the center of the layer (i.e., the mean value for the 40 to 45 km layer is plotted at 42.5 km).

Table 1—Number of soundings included in each mean atmosphere model.

Site	Winter (Dec., Jan., Feb.)	Summer (June, July, Aug.)	Spring/Fall (Mar., Apr., May, Sep., Oct., Nov.)	Annual (Jan.-Dec.)
Natal-Ascension (6 to 8° S)	—	—	—	34
Wallops (38° N)	28	24	41	—
Churchill (59° N)	29	12	13	—
Barrow (71° N)	19	10	17	—

The most recent grenade soundings include error analyses for temperature or both temperature and wind (soundings conducted between 1964 and 1967 were analyzed for temperature error only, and the 1968 through 1969 soundings were analyzed for both temperature and wind errors). In order to give the reader an estimate of the total uncertainty in the data, these errors were averaged and standard deviations from those average values computed. For simplicity, the errors were tabulated in the same fashion as the winds. No errors were computed for pressure and density as these are not only a function of the errors in the temperature profiles (for the grenade technique) but also depend upon the errors contained in the initial pressure reference points which are obtained from balloonsondes.

In Reference 13, some of the same data (1960 to 1968) have been compared with values from "U.S. Standard Atmosphere Supplements, 1966", demonstrating that some substantial differences exist between the statistical mean of the observations and the values from their corresponding latitude and season standard models. Of course, the argument can be made that the observations are valid for only one station, while the standard model is an attempt to give a representative value for a given latitude (i.e., all longitudes). However, the standard models relied heavily upon earlier observations even though they were more sparse than the data reported here, and as will be shown later, conditions at one latitude vary greatly with longitude.

The resulting statistical models, presented both graphically and in tabular form, are given in Figures 2 through 5 and the corresponding Tables A.1 through A.4 and B.1 through B.4. These values are the results of arithmetically averaging all of the included data, and no interpretation of the individual mean profiles is given, other than to note that the atmosphere varies greatly with both season and geographical location.

## ANALYSIS OF RESULTS

The remainder of this report is concerned with the analysis of the mean profiles. Time and meridional cross sections of mean temperature, pressure, density, and wind, as well as mean seasonal synoptic maps at 60, 70, and 80 km, have been presented (see Reference 14). As might be expected, these analyses lack detail due to the sparse data available and the smoothing which is inherent in compiling mean values. Nevertheless, the cross sections and maps are useful in describing the gross characteristics of the thermodynamic structure and general circulation of the atmosphere between about 40 and 100 km altitude, primarily over the North American continent.

In Figures 6(a) through 6(d), the mean monthly temperature profiles for each site were analyzed as a function of time. Figure 6(a), which shows the mean temperature cross section for Natal, is characterized by its uniformity below 75 km. There is an insignificant annual variation in the stratopause temperature; the total change is less than 10 K throughout the year. The warmest temperatures at the stratopause occur in the February through April period. The lapse rates in the mesosphere do not vary significantly with time below 70 km. The upper mesosphere and lower thermosphere monthly means are subject to 10 to 20 K changes during the course of the year, probably more as a result of incomplete removal of the tidal components rather than a genuine seasonal effect.

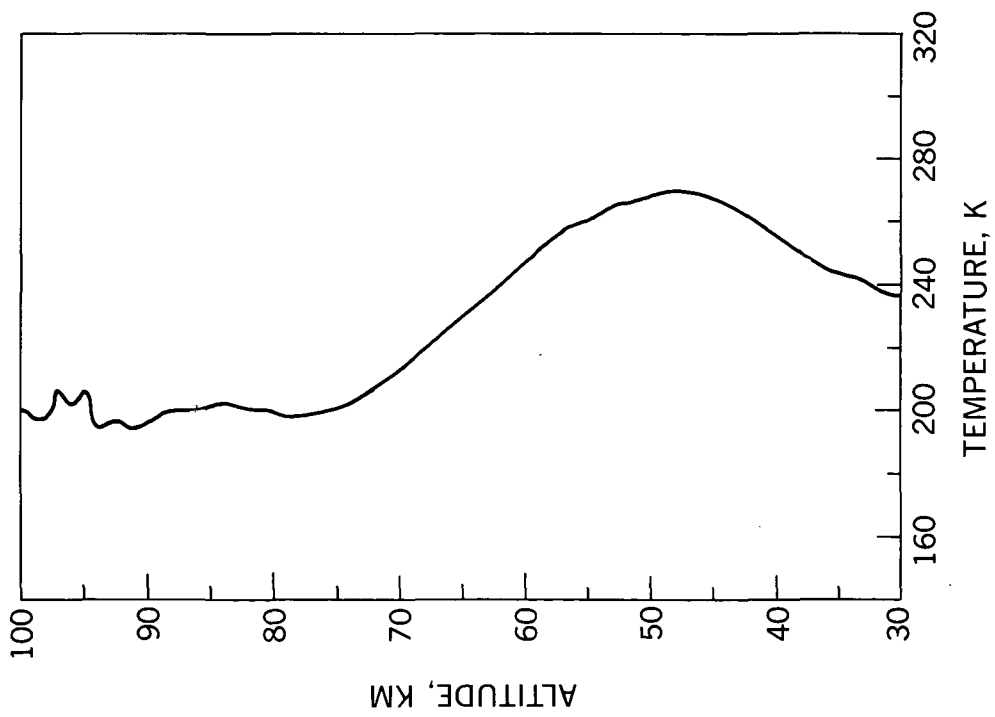


Figure 2(a)—Mean annual temperature profile for Natal-Ascension (6° S to 8° S) based on 34 soundings.

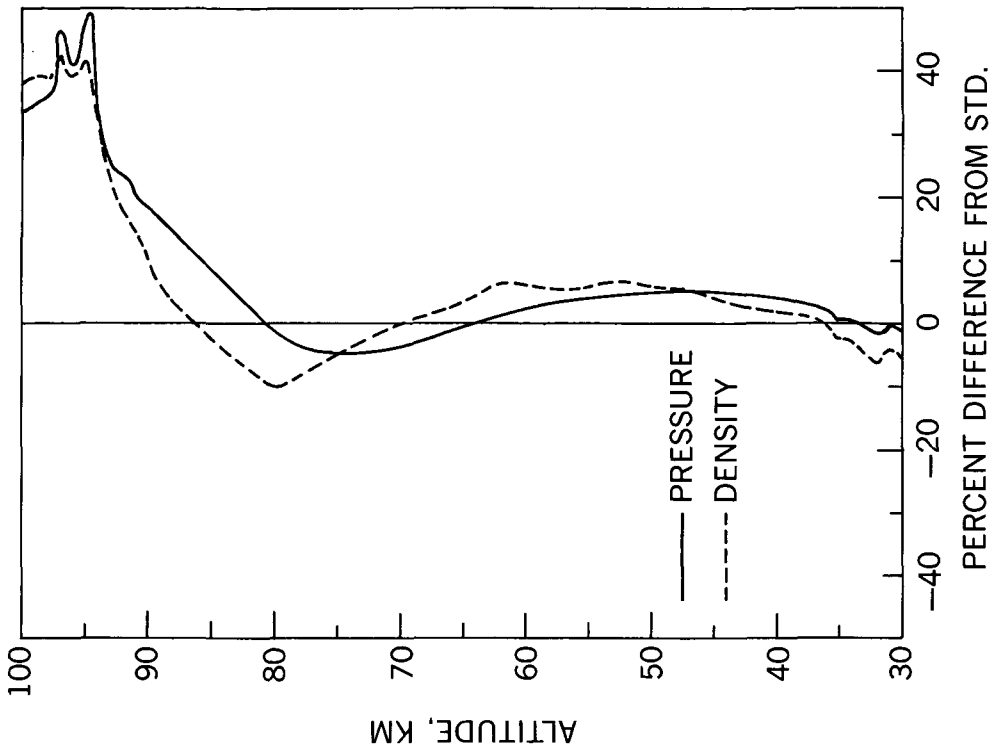


Figure 2(b)—Mean annual pressure and density profiles for Natal-Ascension (6° S to 8° S) based on 34 soundings. (Standard is Reference 2.)

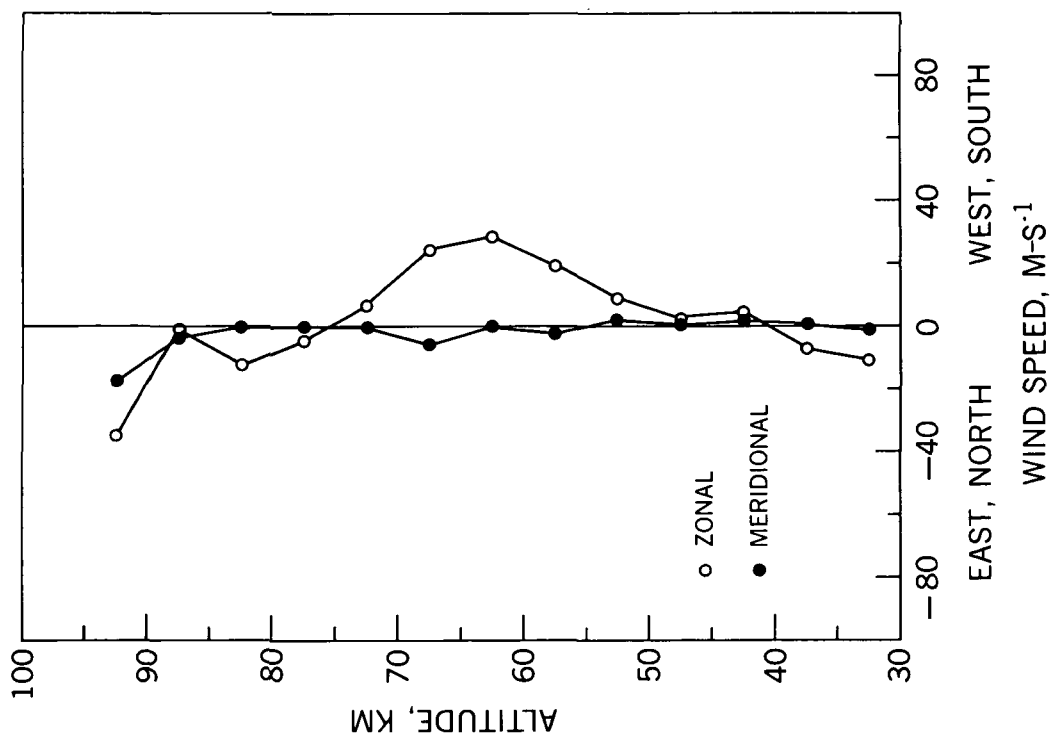


Figure 2(c)—Mean annual wind components for Natal-Ascension (6° S to 8° S) based on 28 soundings.

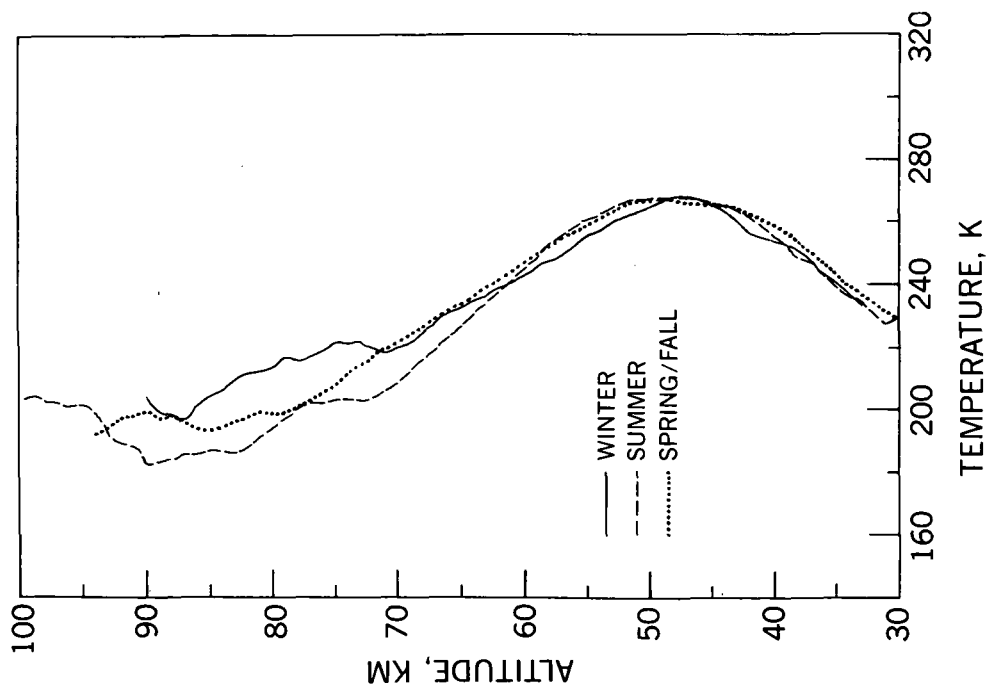


Figure 3(a)—Mean seasonal temperature profiles for Wallops Island (38° N) based on 28 winter, 24 summer, and 41 transition soundings.

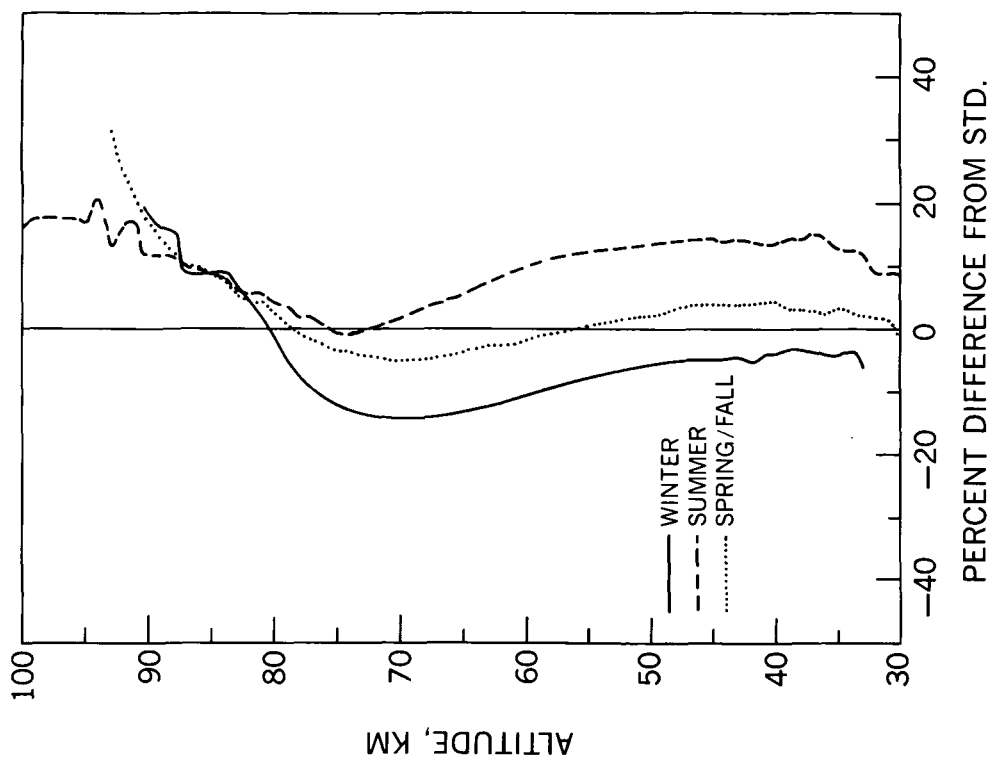


Figure 3(b)—Mean seasonal pressure profiles for Wallops Island (38° N) based on 28 winter, 24 summer, and 41 transition soundings. (Standard is Reference 2.)

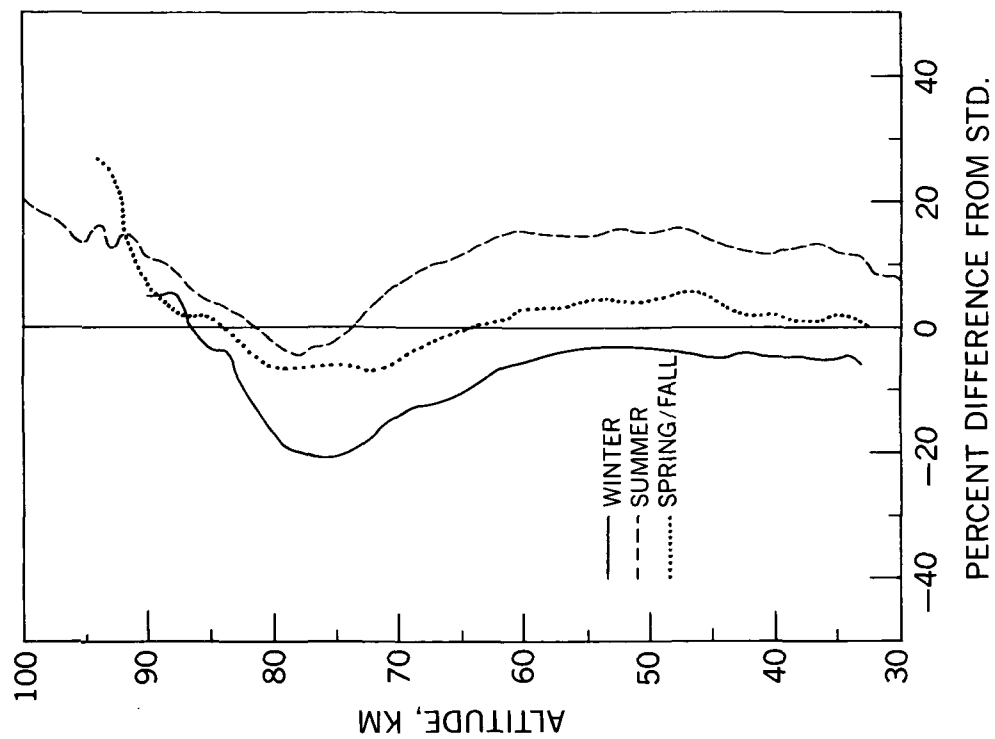


Figure 3(c)—Mean seasonal density profiles for Wallops Island (38° N) based on 28 winter, 24 summer, and 41 transition soundings. (Standard is Reference 2.)

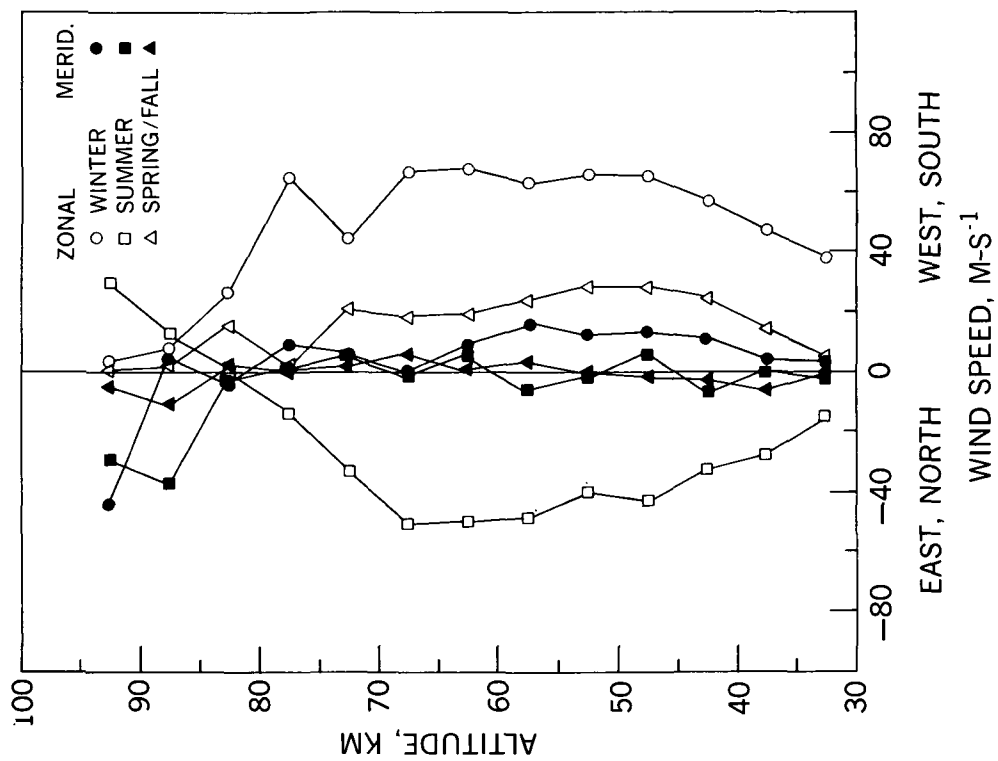


Figure 3(d)—Mean seasonal wind components for Wallops Island (38° N) based on 28 winter, 19 summer, and 39 transition soundings.

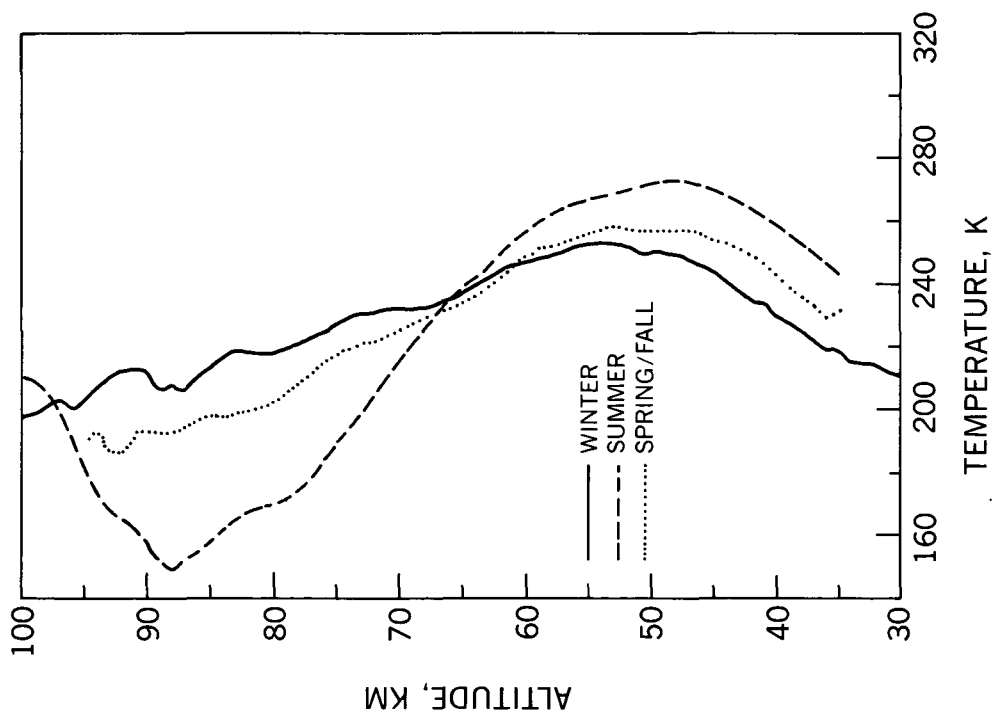


Figure 4(a)—Mean seasonal temperature profiles for Churchill (59° N) based on 29 winter, 12 summer, and 13 transition soundings.

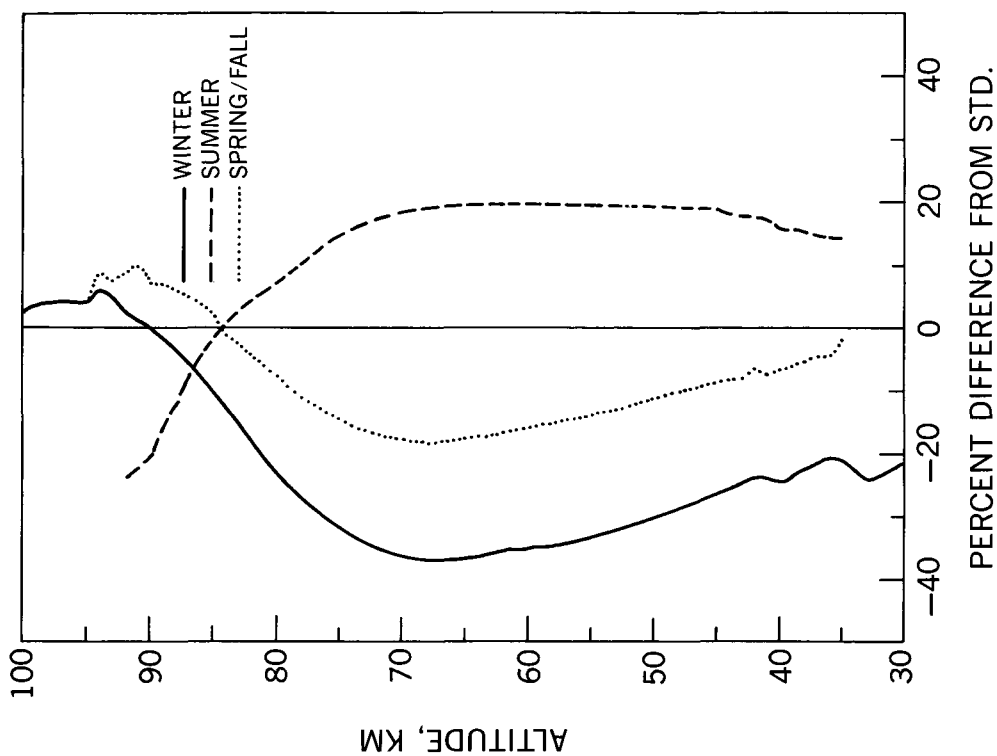


Figure 4(b)—Mean seasonal pressure profiles for Churchill (59° N) based on 29 winter, 12 summer, and 13 transition soundings. (Standard is Reference 2.)

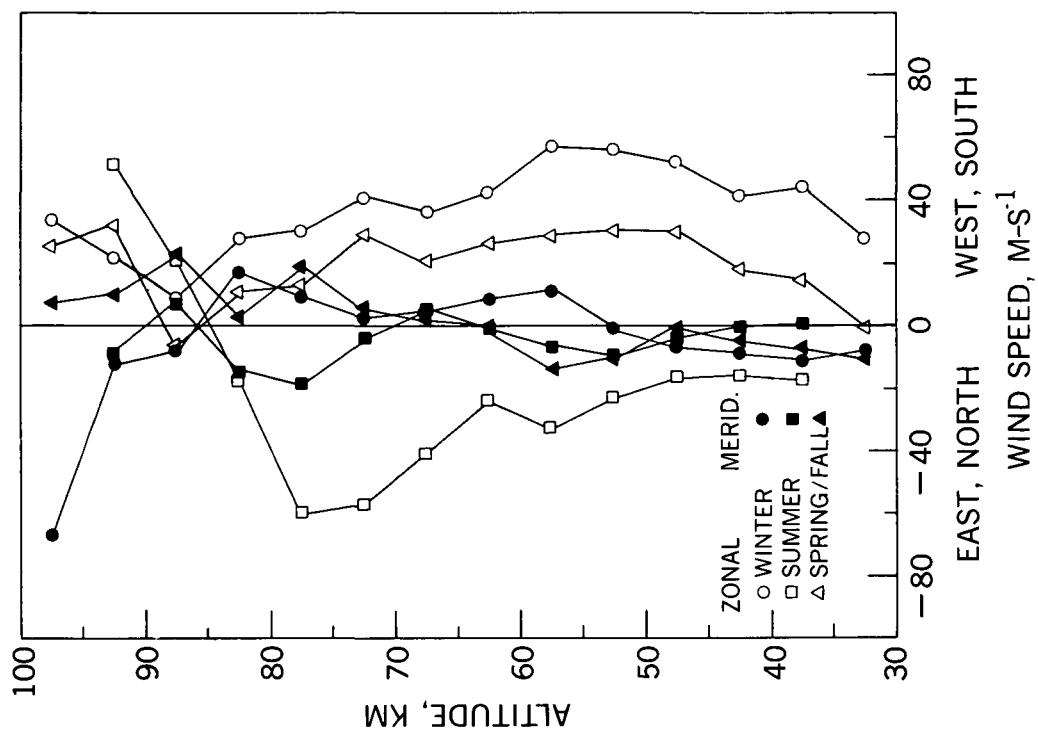


Figure 4(d)—Mean seasonal wind components for Churchill (59° N) based on 25 winter, 11 summer, and 13 transition soundings.

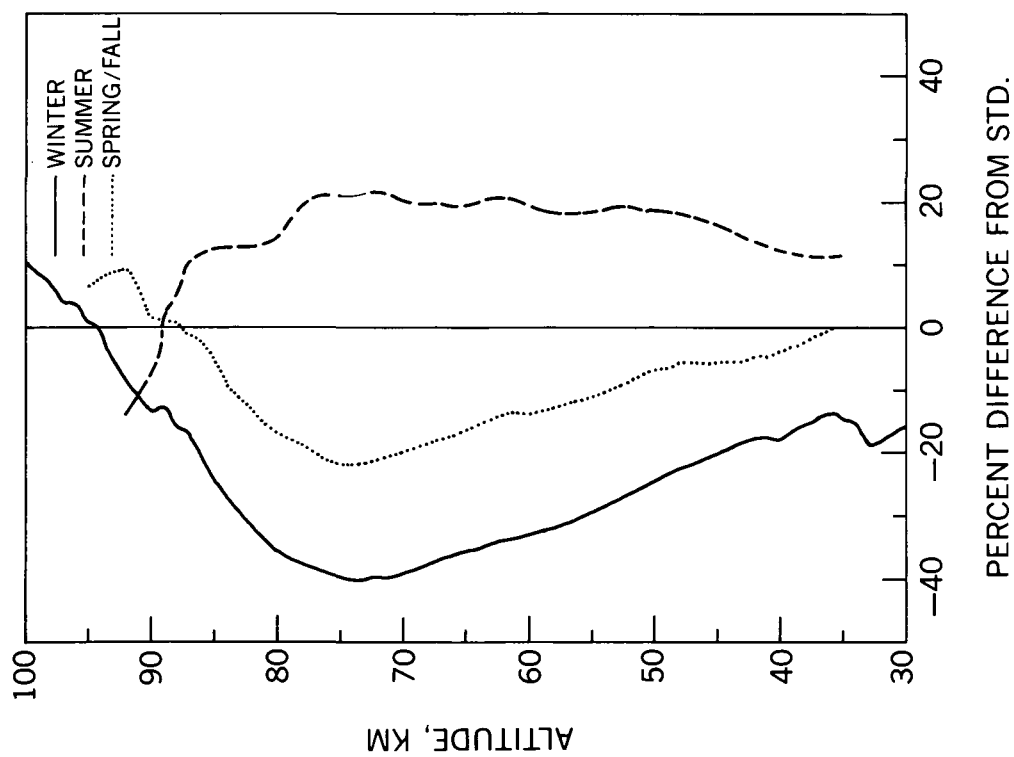


Figure 4(c)—Mean seasonal density profiles for Churchill (59° N) based on 29 winter, 12 summer, and 13 transition soundings. (Standard is Reference 2.)

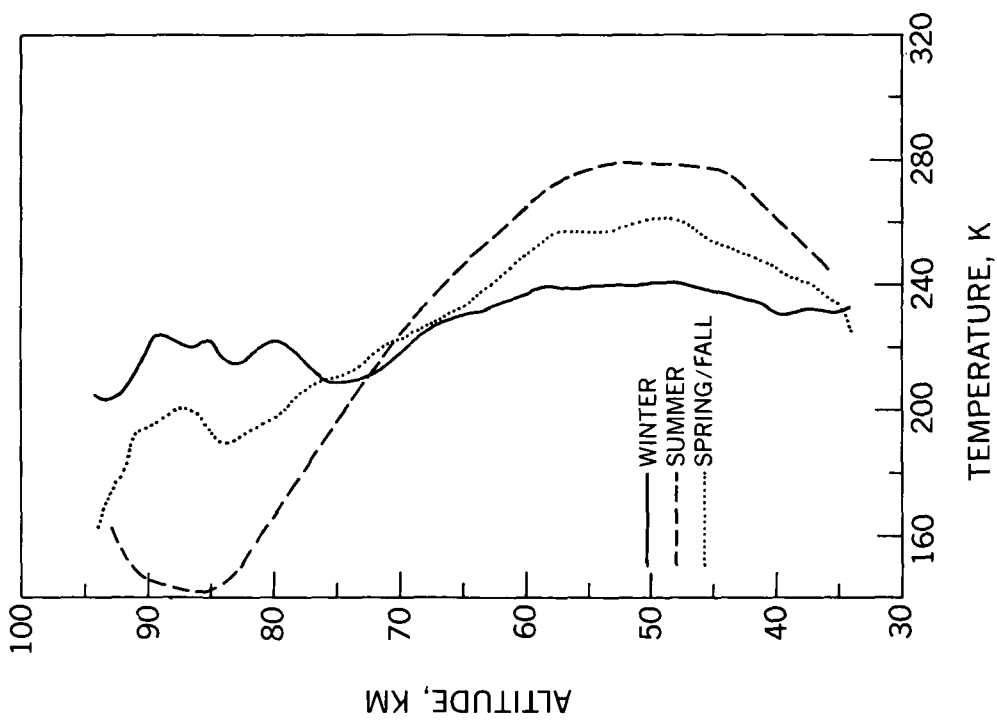


Figure 5(a)—Mean seasonal temperature profiles for Barrow (71° N) based on 19 winter, 10 summer, and 17 transition soundings.

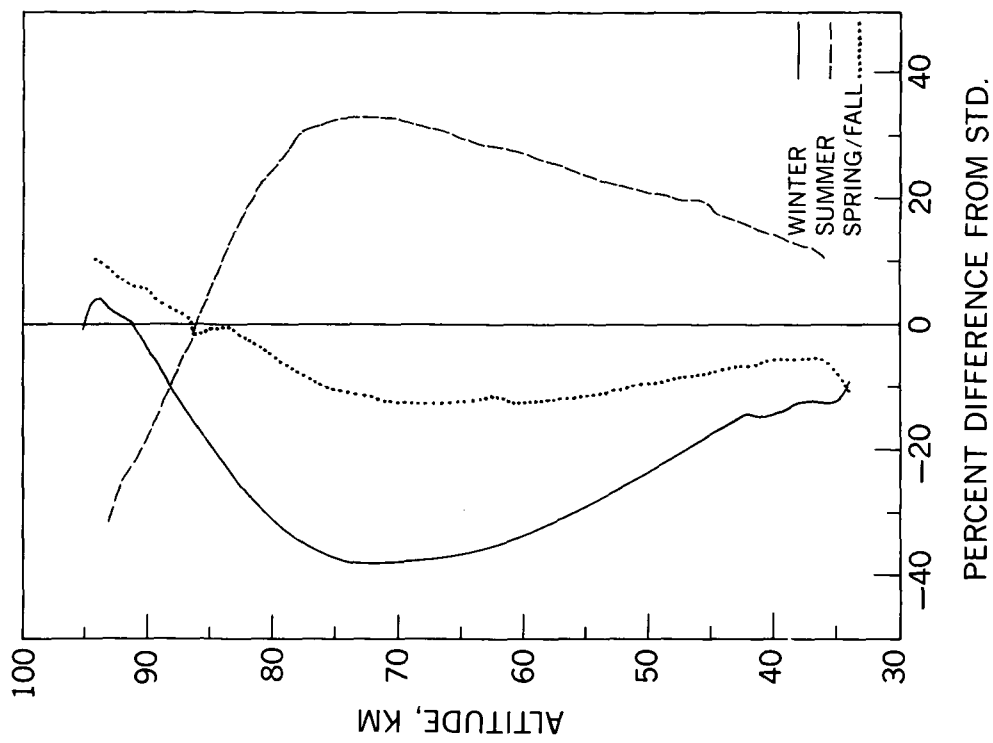


Figure 5(b)—Mean seasonal pressure profiles for Barrow (71° N) based on 19 winter, 10 summer, and 17 transition soundings. (Standard is Reference 2.)

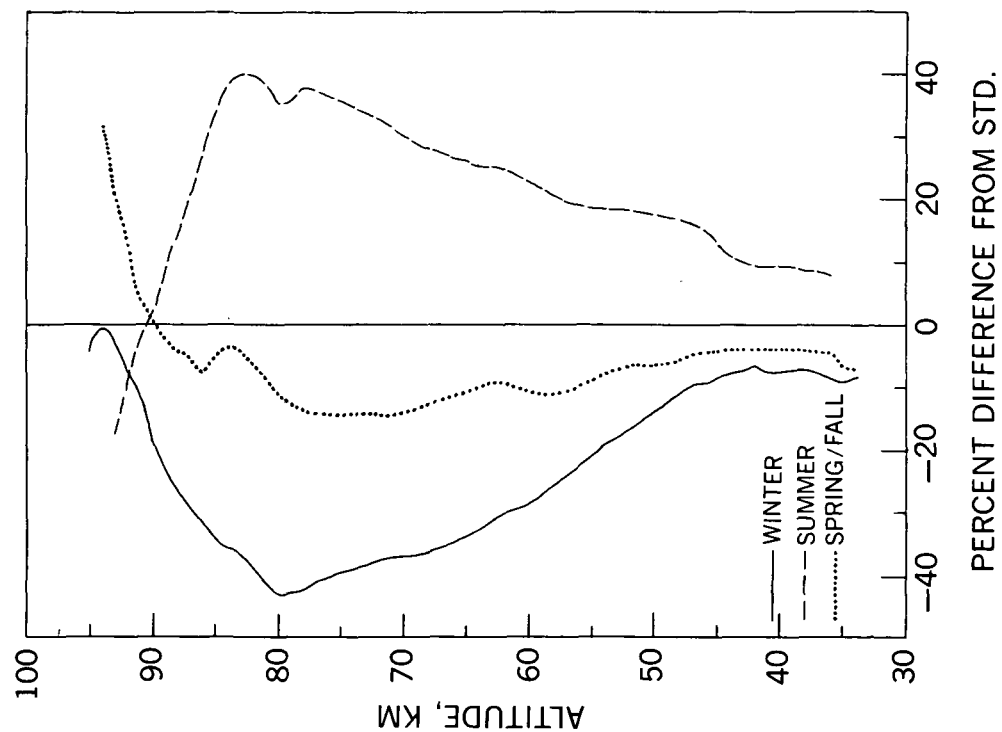


Figure 5(c)—Mean seasonal density profiles for Barrow (71° N) based on 19 winter, 10 summer, and 17 transition soundings. (Standard is Reference 2.)

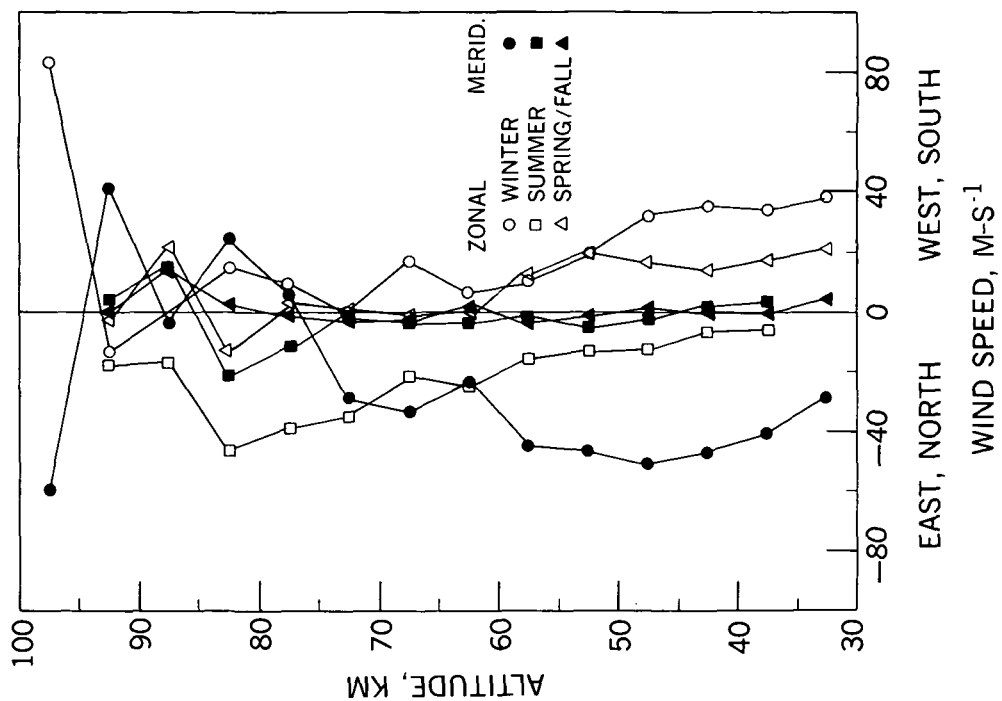


Figure 5(d)—Mean seasonal wind components for Barrow (71° N) based on 19 winter, 10 summer, and 15 transition soundings.

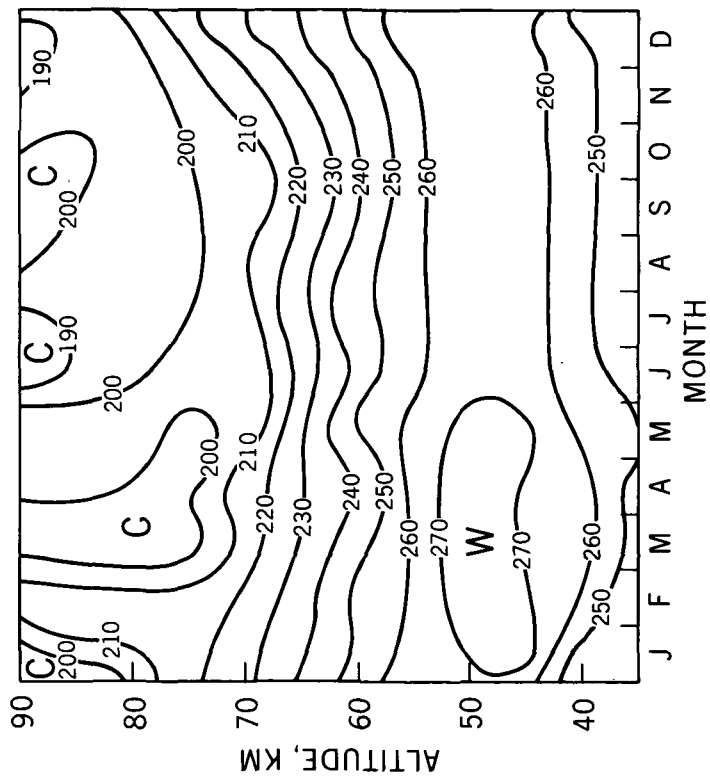


Figure 6(a)—Time cross section of monthly mean temperatures in K for Natal-Ascension (6° S to 8° S) based on 34 soundings.

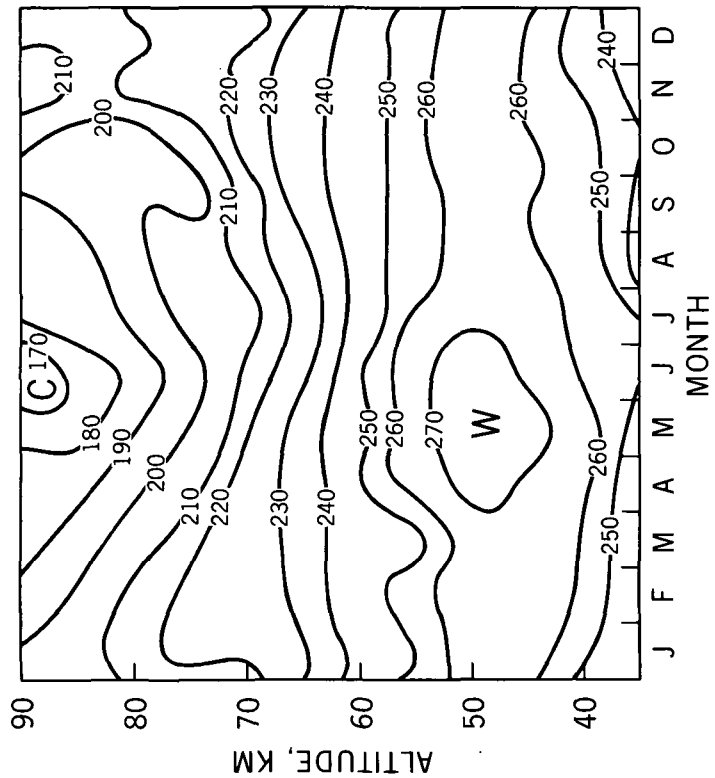


Figure 6(b)—Time cross section of monthly mean temperatures in K for Wallops Island (38° N) based on 93 soundings.

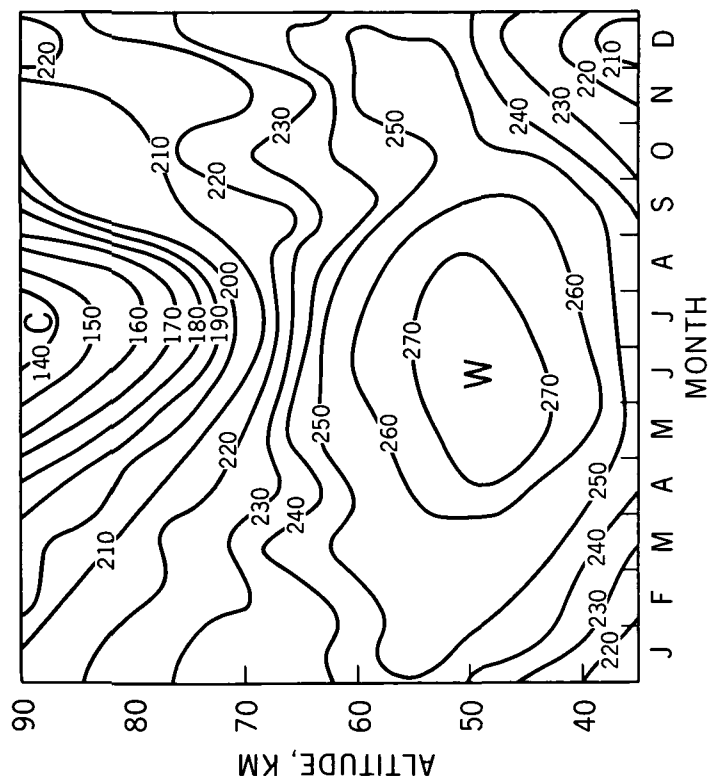


Figure 6(c)—Time cross section of monthly mean temperatures in K for Churchill (59° N) based on 54 soundings.

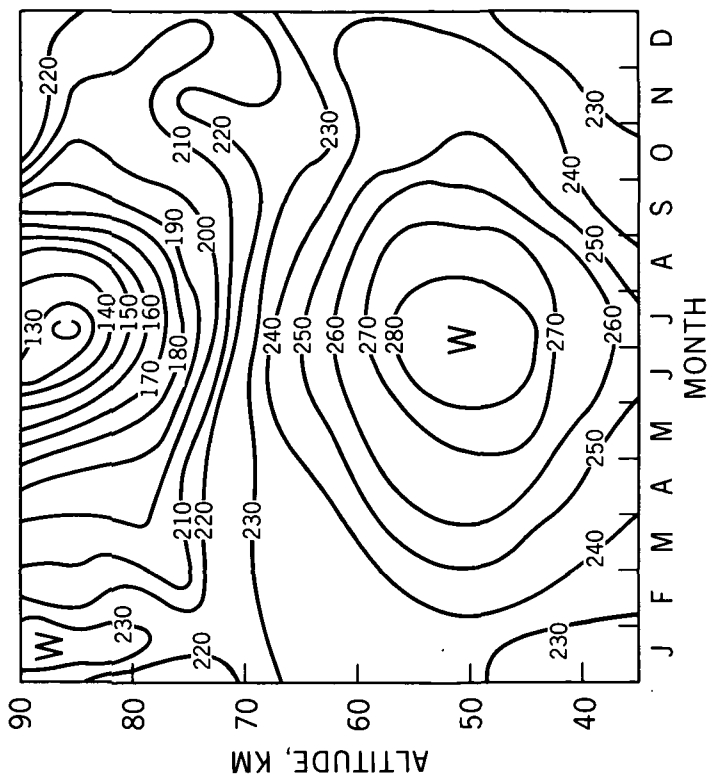


Figure 6(d)—Time cross section of monthly mean temperatures in K for Barrow (71° N) based on 46 soundings.

Figure 6(b), which shows the mean temperature cross section for Wallops Island, indicates a definite annual effect in the temperature structure. The maximum stratopause temperature occurs in the April through June period (late spring to early summer), and the lapse rates in the mesosphere vary considerably from January ( $1.4 \text{ K-km}^{-1}$ ) to July ( $2.5 \text{ K-km}^{-1}$ ). Also, there is a pronounced annual effect in the upper mesosphere, where the mesopause in summer is some 40 K colder than it is in winter. The strong temporal temperature changes, especially in the 70 to 80 km region in winter, are indicative of the seasonal effect that is observed over Wallops Island, which is absent from the low latitude results.

The mean temperature cross section for Churchill, shown in Figure 6(c), contains the same patterns that were present in the Wallops structure, but here, they are more pronounced. The mean monthly stratopause temperature varies by more than 30 K with season and reaches its warmest value in early summer. The mesopause temperature has a mean value of approximately 140 K in June through July, considerably colder than any temperatures found at lower latitudes. The annual temperature variation at the 90 km level is more than twice that observed at the stratopause, ranging from a minimum of 140 K in summer to 220 K in winter. Note that the average mesopause occurs at an altitude of almost 90 km in summer but is poorly defined in winter. The very strong changes in monthly mean temperatures at 80 km from spring to late summer occur at a time when the individual profiles are least variable, resulting from a rapid but orderly transition from the disturbed thermal structure of winter.

In the mean cross section for Barrow, given in Figure 6(d), the latitudinal trend mentioned earlier continues. The Barrow mean summer stratopause temperature is the warmest of all the sites, with a value of 280 K, whereas the mean winter stratopause is some 40 K colder. Note in Figures 6(a) through 6(d) that the time when the stratopause is warmest occurs later in the year with increasing latitude. The coldest temperatures observed in the earth's atmosphere are found at the summer mesopause, where a mean value of 130 K occurs in June. In contrast, the mean winter mesosphere above Barrow approaches an isothermal value near 235 K in January. The annual temperature variation at 85 km ranges from 130 K in summer to 230 K in winter, which makes it the largest seasonally induced change in the mixed region of the atmosphere (surface to 105 km). These mean profiles should be used only with due consideration of their standard deviations. For example, the summer mean profile is quite representative of its individual constituent profiles, while the winter mean is not representative of the atmosphere at any one given time due to the highly variable nature of the mesosphere in winter.

With the compilation of the seasonal mean profiles listed in Table 1, it is possible to produce quasi-meridional cross sections along a diagonal path traced across the North American continent from Barrow southeastward through Churchill and Wallops Island and across the western Atlantic Ocean to Natal, as shown in Figure 7(a). The resulting temperature cross section, given in Figure 7(b), forms an organized pattern dominated by the warm stratopause and cold mesopause of the high latitudes in summer and the almost isothermal structure of the high latitudes in winter. These features are, in general terms, similar to the earlier models of Murgatroyd (Reference 15) except that the high latitude summer stratopause and mesopause are colder than in Murgatroyd's model. Figure 7(b) is also similar to the cross section given in the "U.S. Standard Atmosphere Supplements, 1966" (Reference 3), except that the winter mesosphere shown here is colder than in Reference 3.

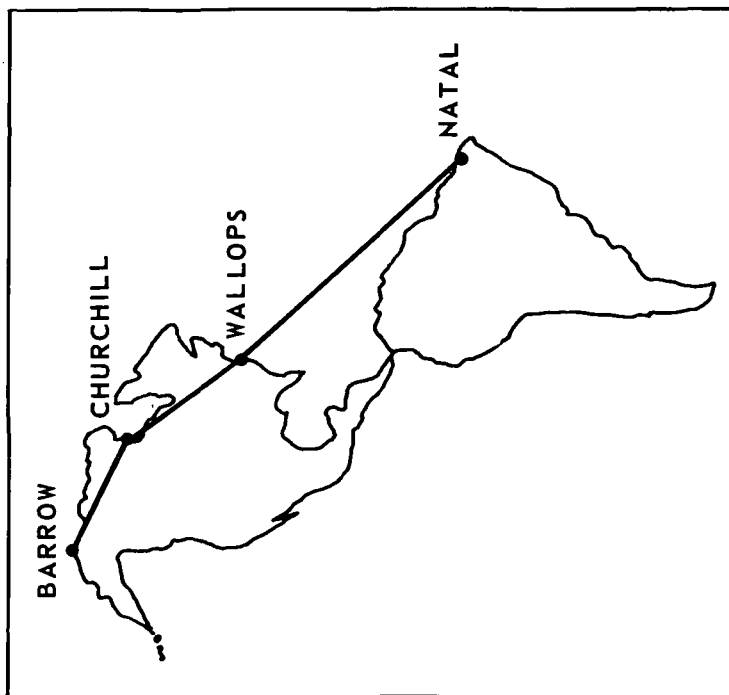


Figure 7(a)—Map showing the path of the quasi-meridional cross sections which follow in Figures 7(b) through 7(d).

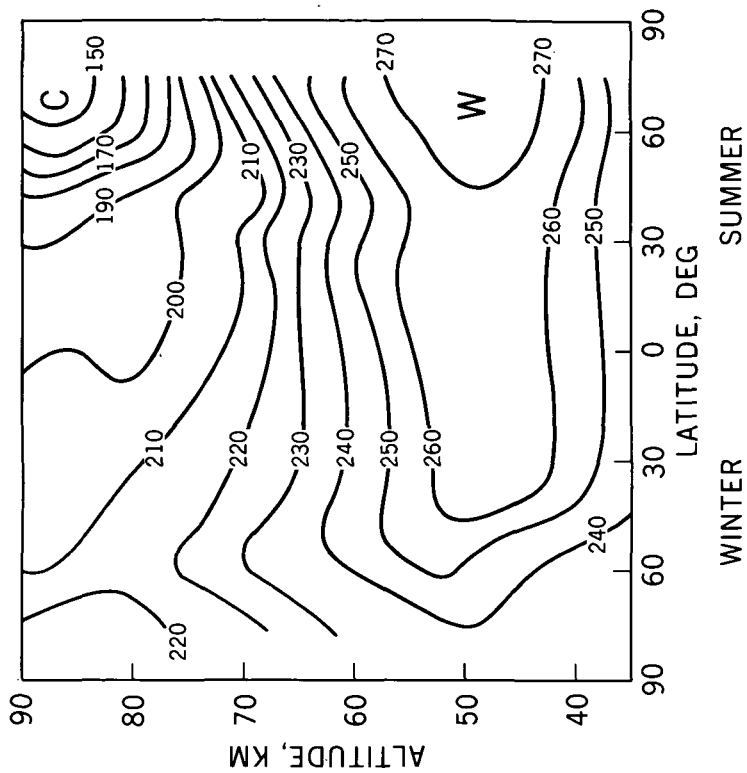


Figure 7(b)—A quasi-meridional cross section of temperature in K for mean winter, summer, and annual temperature values.

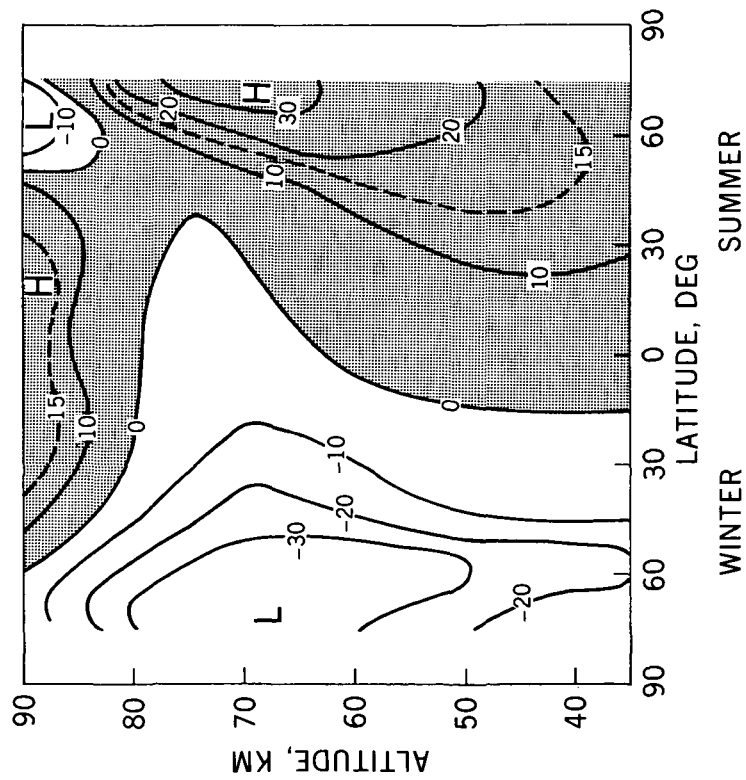


Figure 7(c)—A quasi-meridional cross section of pressure (as percent difference from Reference 2 atmosphere) for mean winter, summer, and annual pressure values.

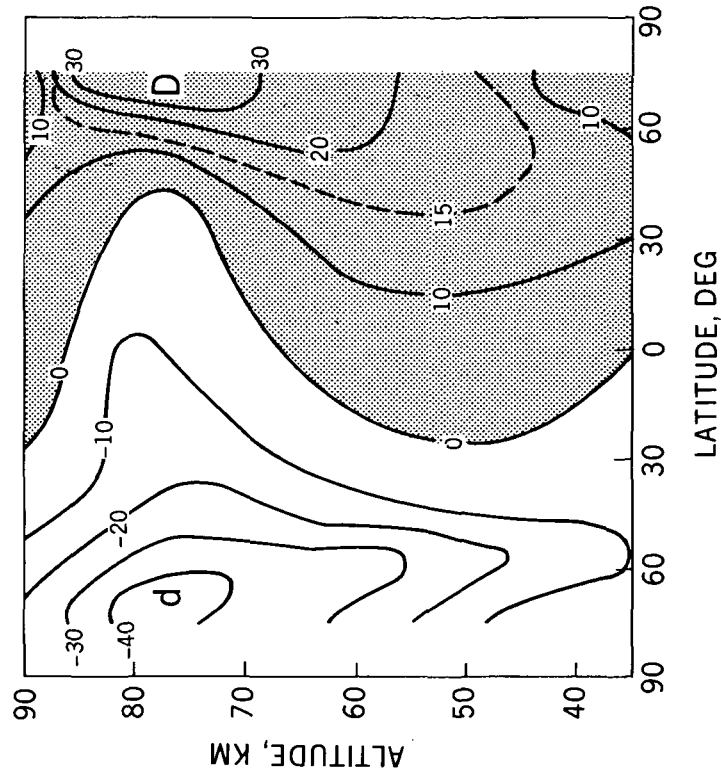


Figure 7(d)—A quasi-meridional cross section of density (as percent difference from Reference 2 atmosphere) for mean winter, summer, and annual density values.

The combination of the mean seasonal pressure profiles into the same quasi-meridional cross section described above results in Figure 7(c). Here, the values are analyzed in percent difference from the “U.S. Standard Atmosphere, 1962” (Reference 2) reference profile for convenience. Note that the zero percent difference line (i.e., exact agreement with the standard model) is most nearly approximated by a low latitude pressure profile in winter, while a well developed low pressure region dominates the winter mesosphere and a high pressure region dominates the summer mesosphere. These differences, of course, drive the mean circulation in the mesosphere and are consistent with the observed winds, as will be shown later. The low pressure (cyclonic) region in the winter mesosphere underlies a high pressure (anticyclonic) region, and the high pressure region in the summer mesosphere underlies a low pressure region. This vertical alternation of pressure systems closely resembles the patterns observed in the troposphere, but the vertical scale sizes are much larger in the upper atmosphere. The relative sizes of the cyclonic and anticyclonic regions in the mesosphere probably result from the locations of the sampling sites with regard to the pressure systems rather than to the actual size of the systems. In other words, longitudinal variability is very important but cannot be evaluated from these data. The areas with the tightest horizontal pressure gradients, near 60 km at 45° N latitude in winter, for example, are the regions where the most intense zonal winds occur. This is again internally consistent with the observed winds.

Figure 7(d) is a quasi-meridional cross section of the mean density. Isopleths are drawn in percent difference from the standard density profile of Reference 2. The variation of density with season and latitude resembles the pressure pattern in Figure 7(c), with low densities over the winter pole and high densities over the summer pole at 80 km. The total annual change in density is approximately 70 percent at 75 km over Barrow (71° N), and obviously should be taken into account in any calculations involving the density in the mesosphere.

The large scale circulation of the mesosphere has not been well documented since relatively few observations of both wind and pressure (derived from temperature in most cases) have been made above 60 km. The circulation analyses presented here are based on the monthly and seasonal mean values from only four sites, and while they are useful to give only a gross picture of the upper stratosphere-mesosphere circulation over North America, they provide a considerable improvement in the circulation estimates based only on one or perhaps two stations.

Figures 8(a) through 8(h) present the time cross sections of zonal and meridional components deduced from the monthly mean winds at each of the four sites considered. The time cross section of mean zonal winds above Natal is given in Figure 8(a). The winds in the 35 to 70 km region are primarily westerly during the months of March through October, with a strong easterly jet of over 60 m·s<sup>-1</sup> at 45 km during December through February. A strong westerly core exceeding 60 m·s<sup>-1</sup> near 60 km occurs in February. While the westerly circulation dominates the upper stratosphere and lower mesosphere, the intensity of the flow is relatively weak, i.e., less than 40 m·s<sup>-1</sup>. A distinct annual pattern is evident at all levels, but the pattern is not precisely defined due to sparse data coverage. Evidence of the quasi-biennial oscillation, if present, is probably masked because of the manner in which the data were averaged. The significance of this representation of the circulation is therefore reduced at altitudes where the quasi-biennial oscillation is important. The mean meridional components of the wind over Natal, given in Figure 8(b), contain only a couple of well-defined features: a northerly

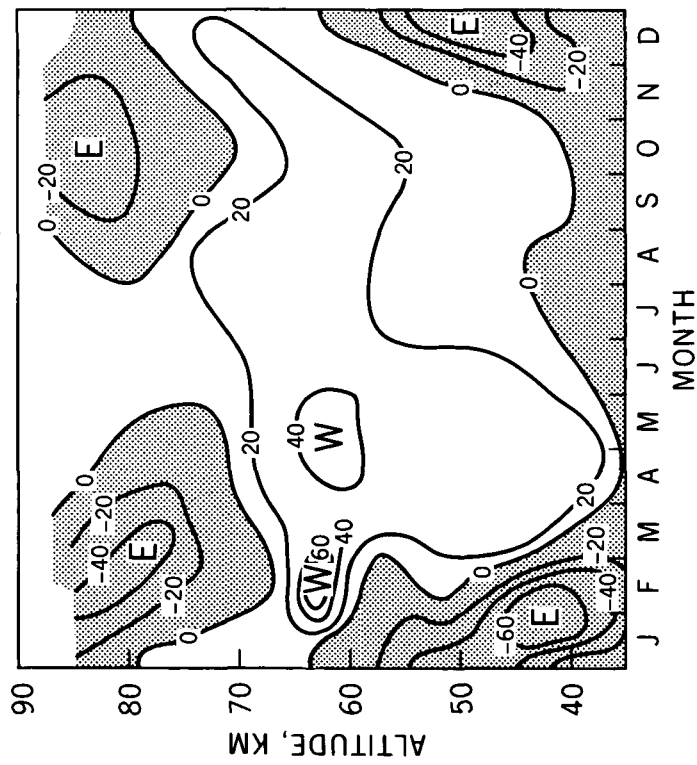


Figure 8(a)—Time cross section of monthly mean zonal winds in  $\text{m}\cdot\text{s}^{-1}$  for Natal-Ascension ( $6^{\circ}\text{S}$  to  $8^{\circ}\text{S}$ ).

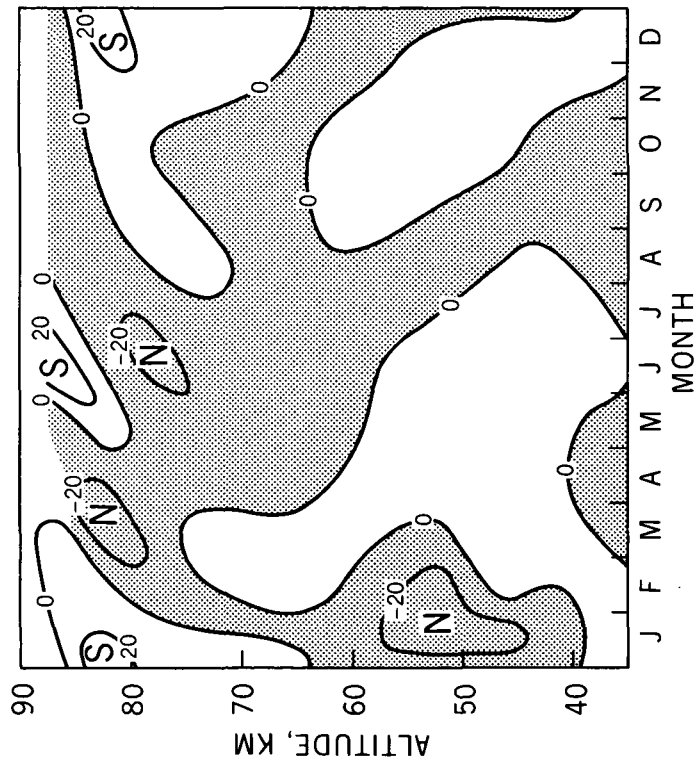


Figure 8(b)—Time cross section of monthly mean meridional winds in  $\text{m}\cdot\text{s}^{-1}$  for Natal-Ascension ( $6^{\circ}\text{S}$  to  $8^{\circ}\text{S}$ ).

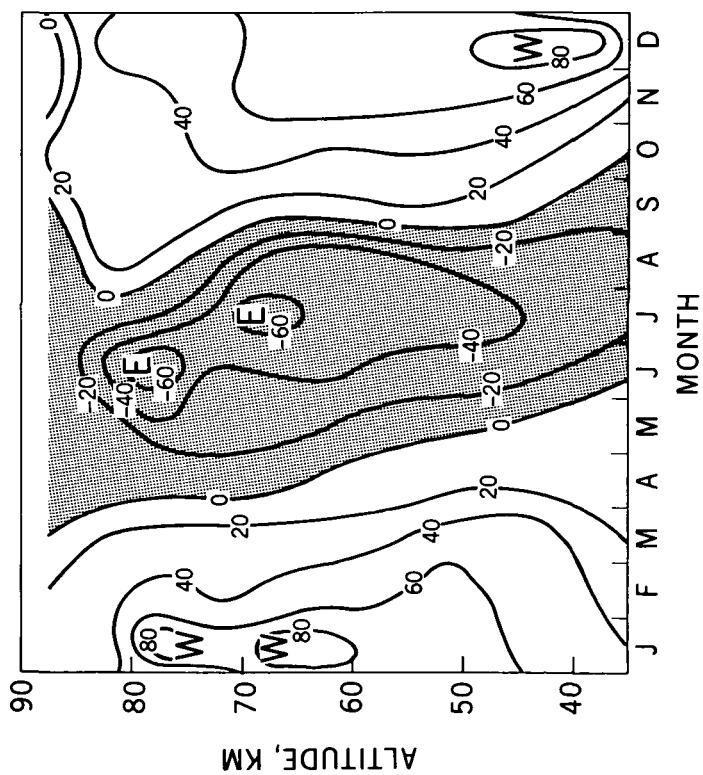


Figure 8(c)—Time cross section of monthly mean zonal winds in  $\text{m-s}^{-1}$  for Wallops Island ( $38^\circ \text{N}$ ).

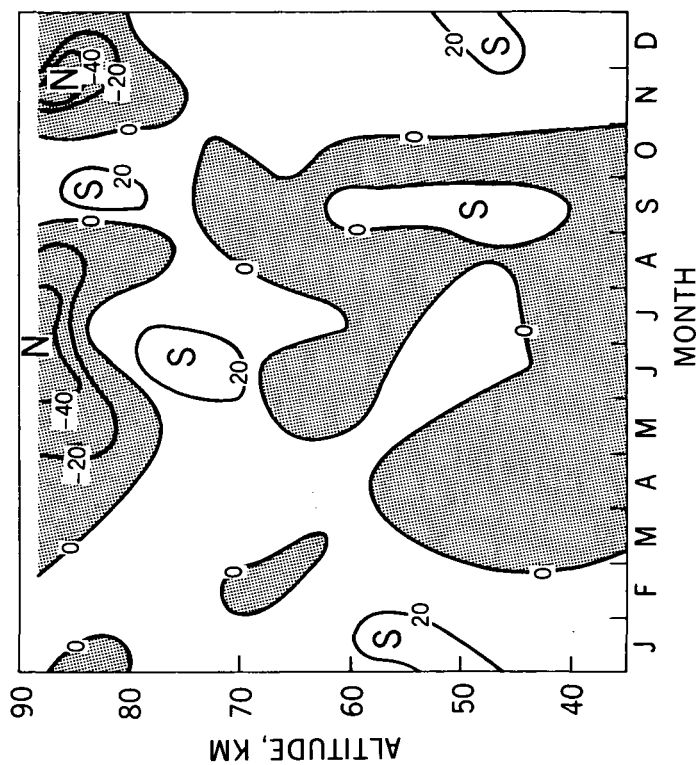


Figure 8(d)—Time cross section of monthly mean meridional winds in  $\text{m-s}^{-1}$  for Wallops Island ( $38^\circ \text{N}$ ).

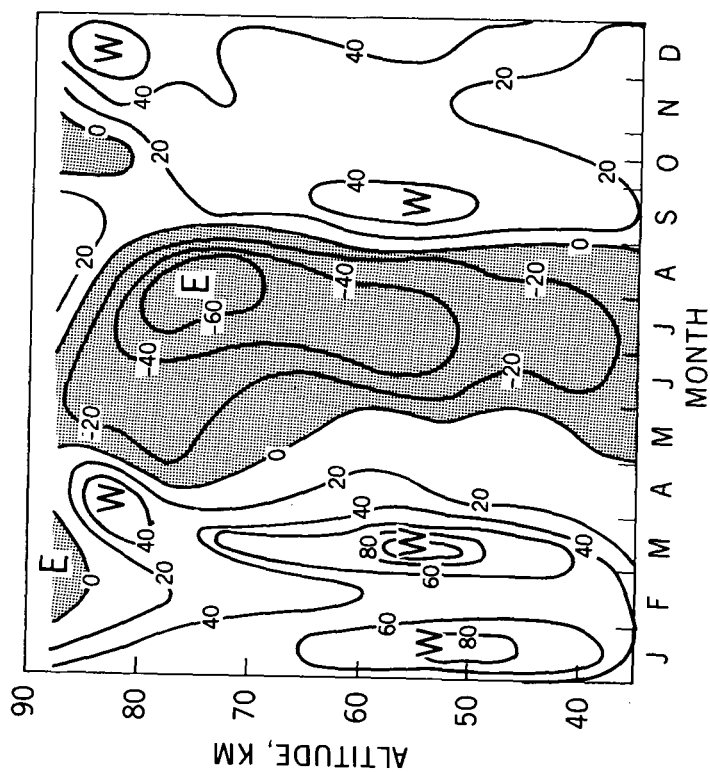


Figure 8(e)—Time cross section of monthly mean zonal winds in  $\text{m}\cdot\text{s}^{-1}$  for Churchill ( $59^\circ \text{N}$ ).

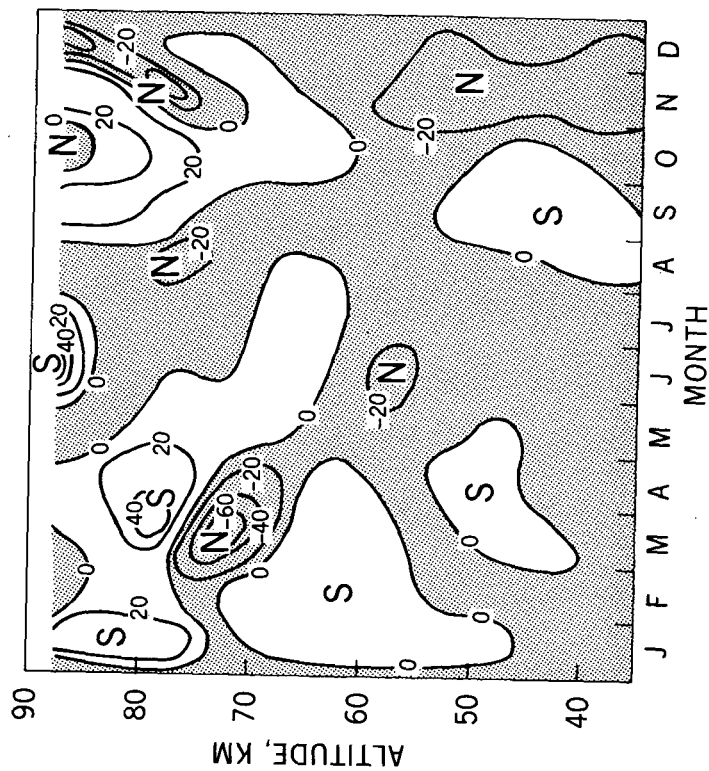


Figure 8(f)—Time cross section of monthly mean meridional winds in  $\text{m}\cdot\text{s}^{-1}$  for Churchill ( $59^\circ \text{N}$ ).

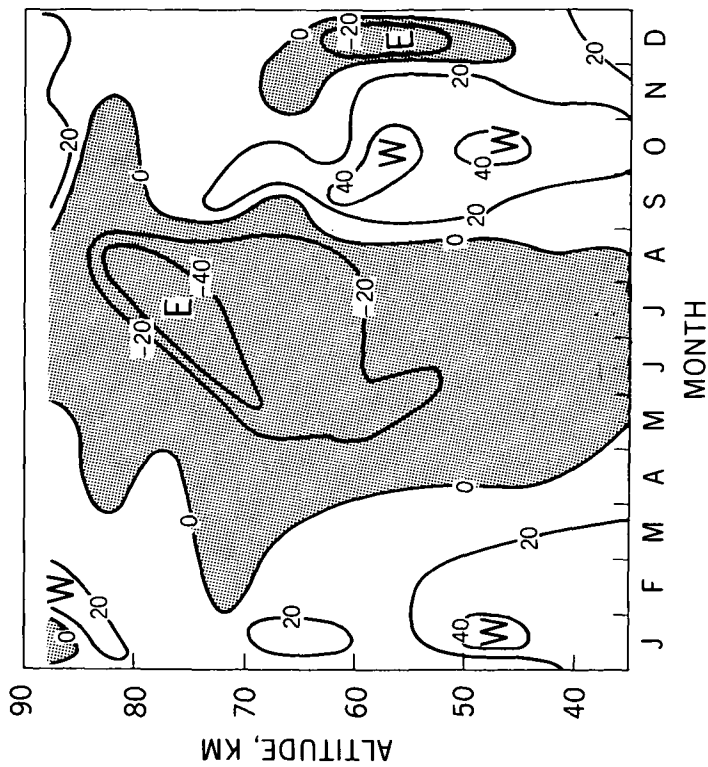


Figure 8(g) — Time cross section of monthly mean zonal winds in  $\text{m}\cdot\text{s}^{-1}$  for Barrow ( $71^\circ \text{N}$ ).

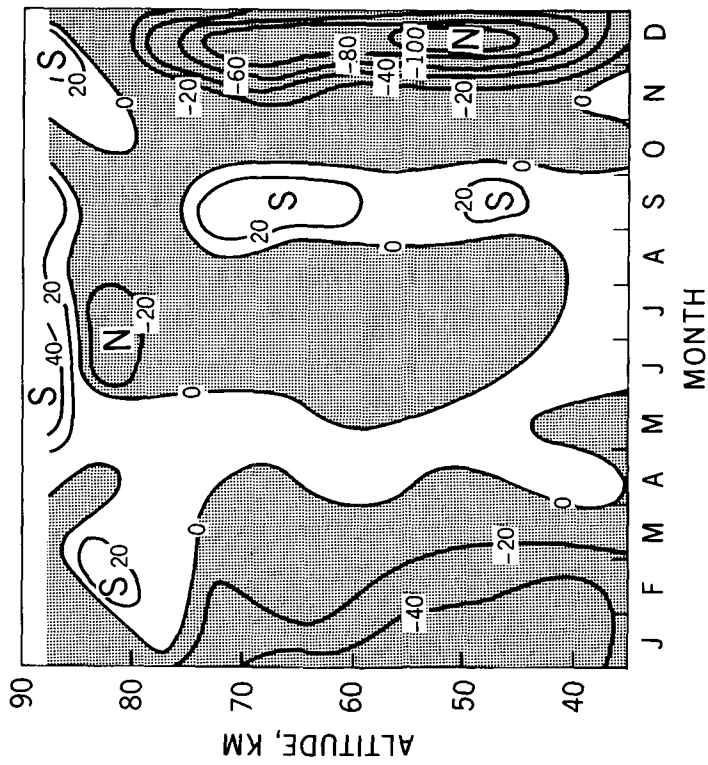


Figure 8(h) — Time cross section of monthly mean meridional winds in  $\text{m}\cdot\text{s}^{-1}$  for Barrow ( $71^\circ \text{N}$ ).

component of over  $20 \text{ m-s}^{-1}$  in February at the stratopause and a reversal in the winds approximately every 3 months above 80 km. The remainder of the meridional circulation is weak, and its significance is not clear.

Figure 8(c), which gives the mean zonal winds above Wallops Island, shows the distinct annual variation in the circulation. Strong westerly winds with peak speeds exceeding  $90 \text{ m-s}^{-1}$  dominate the entire mesosphere during January when the flow is most intense. The westerlies gradually diminish during late winter so that by early spring, the flow direction reverses at upper levels first. The change to easterly flow is complete by late May. The easterly circulation develops to a maximum of over  $60 \text{ m-s}^{-1}$  in June and July, then weakens until by September, westerly flow is reestablished.

The mean meridional winds over Wallops Island, shown in Figure 8(d), do not exhibit a strong seasonal pattern. In broad terms, they are predominately southerly during the winter months and generally northerly from March to October. Two intense northerly cores of over  $40 \text{ m-s}^{-1}$  exist at the 85 to 90 km level in July and December, but elsewhere, the meridional wind speeds are light.

The zonal winds above Churchill, given in Figure 8(e), are characterized by two strong westerly jets in winter near 55 km, a maximum easterly flow in August at 75 km, and a strong annual cycle in the direction of the circulation. The westerly jet in March, which exceeds  $100 \text{ m-s}^{-1}$  indicates that perhaps this flow might be in some way associated with the retreating mean position of the polar fronts in the troposphere and the jet stream at the tropopause. The short duration of the easterly regime is consistent with the abbreviated summer at these latitudes, and the more chaotic flow pattern in winter results from the generally disturbed structure of the mesosphere in winter.

Figure 8(f), which shows the mean meridional components of the Churchill circulation, is without a consistent pattern. The dominance of northerly components below 65 km, the strong northerly core of over  $60 \text{ m-s}^{-1}$  which occurs in March at 70 km, and the sharply changing nature of the 85 to 90 km layer in November and December are noteworthy, however.

Figure 8(g) shows the mean zonal winds over Barrow. A seasonal dependence is obvious, although it is not as strong as in the Wallops and Churchill cases. The most prominent features include a moderate westerly flow in January and October, a moderate easterly circulation centered near 75 km in July, an abrupt reversal of flow direction in August, and the reappearance of easterly flow at 45 to 65 km in December. The position of Barrow with respect to the pressure systems makes it atypical of its latitude. The lack of an intense westerly flow in winter can be attributed to the fact that there are easterly components generated by the Aleutian Anticyclone even in January. These easterlies dominate the circulation in December in the lower mesosphere and probably contribute to the extended duration of easterly flow in summer.

The mean meridional winds above Barrow, given in figure 8(h), exhibit a reasonably consistent pattern with other nontropical sites except that the meridional circulation is very intense. Strong northerly components of up to  $100 \text{ m-s}^{-1}$  dominate the December mesosphere. These northerly components also occur in January and February, when their vertical extent includes the entire mesosphere. A strong southerly flow above 85 km is observed from May until late September. The April to September period is marked by generally light meridional components, with northerly flow

prevailing in June, July, and August. Once again, the position of Barrow on the western edge of the North American continent, where it lies between the anticyclonic regime over the Gulf of Alaska and the cyclonic flow over the Arctic, probably accounts for this atypical behavior.

Figures 9(a) through 9(i) present the mean seasonal maps over the North American continent for the 60, 70, and 80 km levels. These maps are polar stereographic projections with the North Pole indicated by the X at the top center of each figure. Longitudes radiate from that point, and latitudes are concentric circles, the center of which is the pole. The maps were analyzed by plotting the mean wind and mean pressure for the appropriate level for each of the three sites previously mentioned. In addition, the mean data from the Meteorological Rocket Network (MRN) for January, July, and October were plotted in the winter, summer, and transition maps to aid in the analyses. Isobars were drawn at convenient intervals, but these intervals are consistent for a given level. (For example, the pressure gradients on the 70 km winter map can be compared with the pressure gradients on the 70 km summer map directly.) As the altitude increases, horizontal pressure gradients become weaker, necessitating the choice of smaller intervals of pressure to describe the flow at higher levels. These analyses are geostrophic, which means that the curvature of the isobars, friction, and all short term effects have been neglected. Most of these analyses have been published in Reference 14 but are included here because they constitute an integral part of the climatology of the mesosphere. The mean wind and pressure values given in Figures 2 through 5 were supplemented with data from Reference 16.

Figure 9(a), which gives the mean winter circulation at 60 km, indicates that the flow is dominated by a vortex centered over north central Canada, far from the geographic pole. This circulation produces strong westerly winds over most of the continent and a predominately northerly component over Alaska. If the analysis is accurate where broken lines are shown, strong southerly winds occur over Greenland. The polar asymmetry of the flow, then, provides a ready means for the transport of atmospheric properties across latitude circles. Note that in north central Canada, where the vortex center occurs, the pressure increases by a factor of almost two in summer, as shown in Figure 9(b).

The mean summer circulation at 60 km [Figure 9(b)] is dominated by an anticyclone to the north whose center cannot be determined from the available data. This pattern produces easterly winds over most of the continent, with the strongest zonal components occurring along the southern portion of the United States. The pressure gradients are smaller in magnitude in summer than in winter, producing generally lighter winds.

Figure 9(c), which gives the mean transition circulation at 60 km, indicates that a vortex drives the flow, but it is less intense than in winter. Wind speeds are everywhere lower, and an anticyclonic flow is indicated at Barrow. The mean pressures at all three stations during the transition months lie between the extremes of winter and summer.

The mean winter circulation at 70 km, which shows the presence of the vortex seen at lower levels, is given in Figure 9(d). Most of the discussion which applied at 60 km also applies at this level, so a detailed description is unnecessary. A significant difference is that the maximum winds observed at 70 km are not as intense as those observed at 60 km. There appears to be no symmetry over the pole at either level.

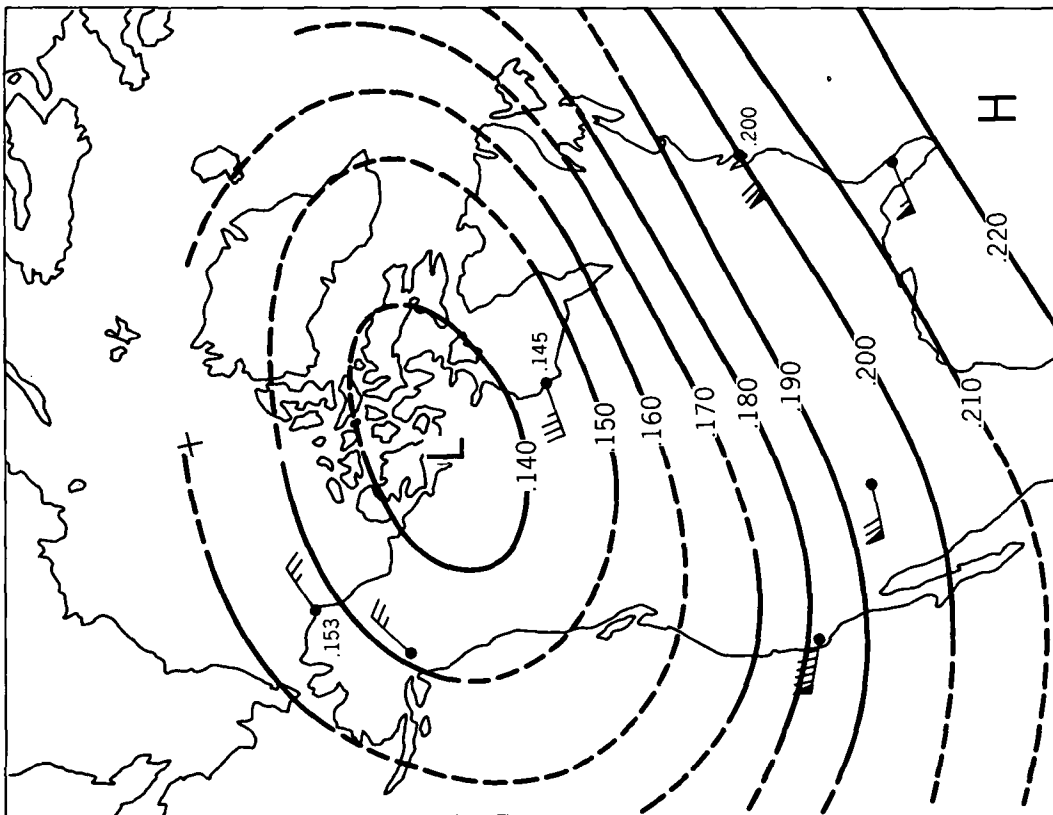


Figure 9(a)—Mean winter circulation at 60 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

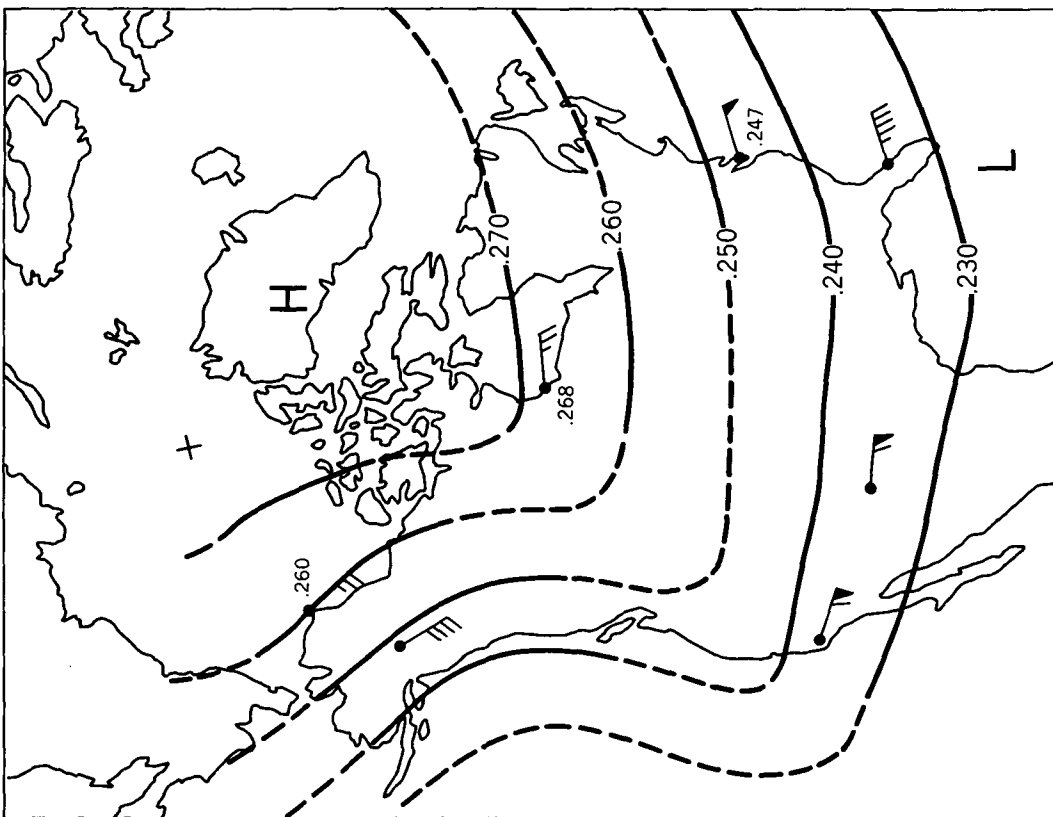


Figure 9(b)—Mean summer circulation at 60 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

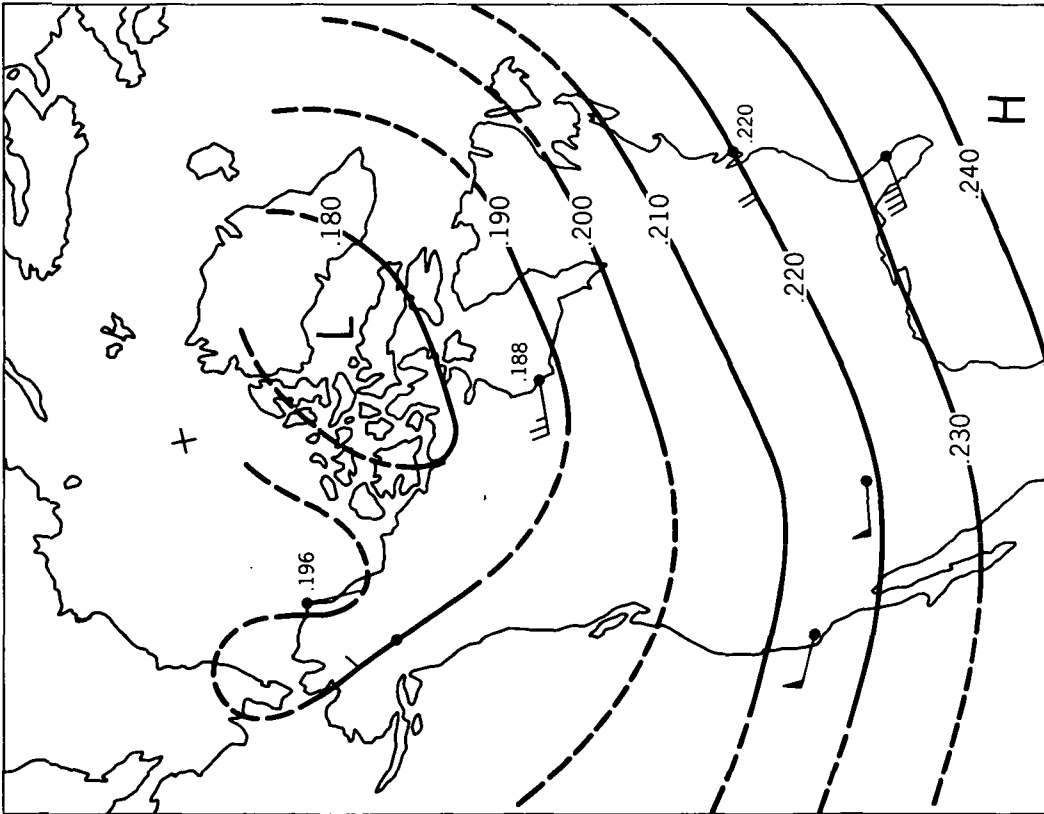


Figure 9(c)—Mean transition (spring/fall) circulation at 60 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

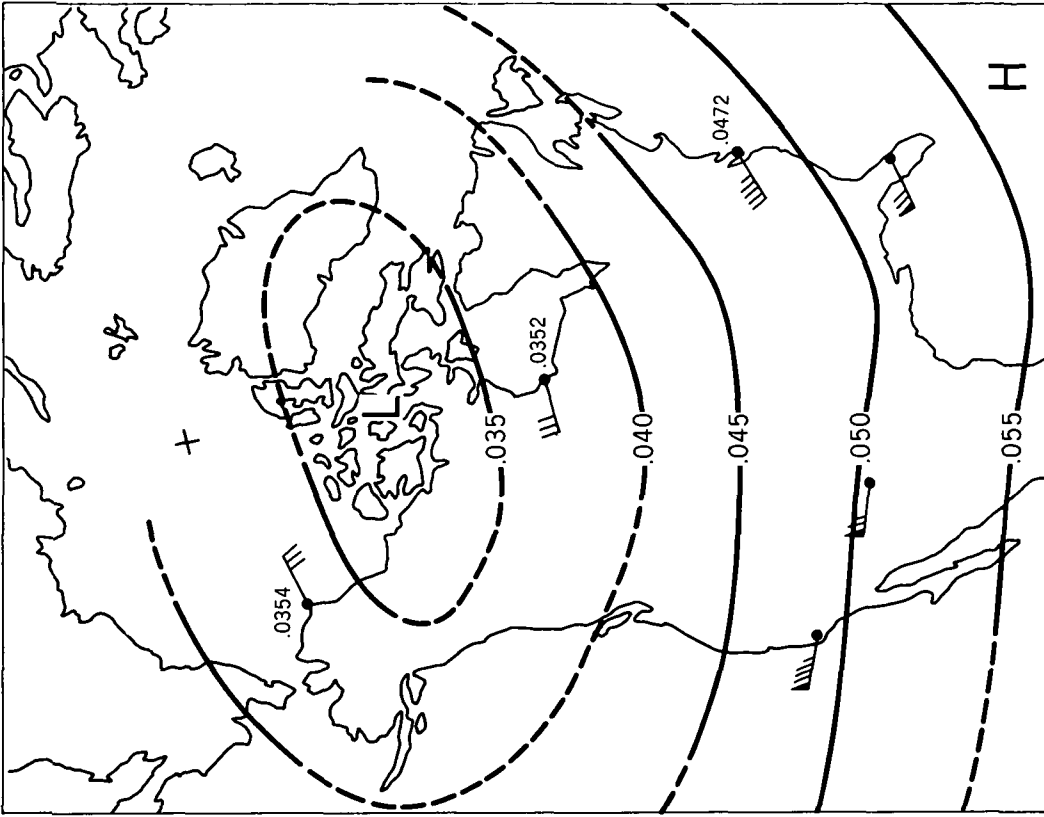


Figure 9(d)—Mean winter circulation at 70 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

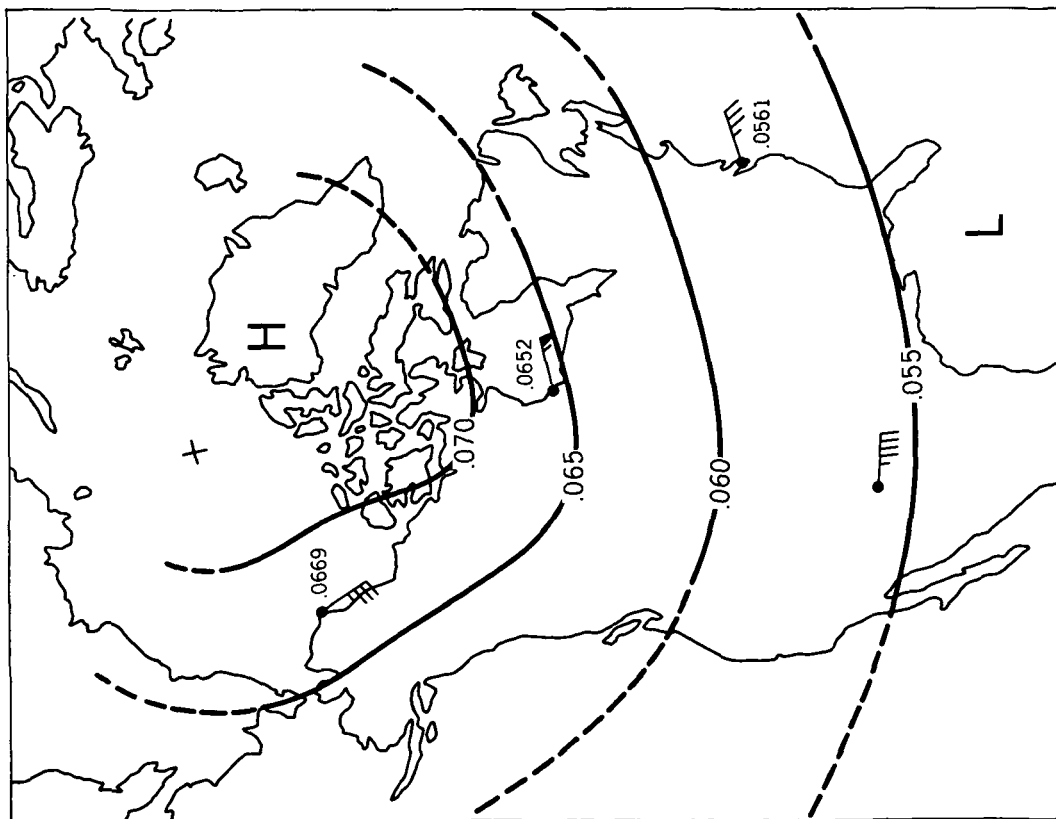


Figure 9(e) —Mean summer circulation at 70 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

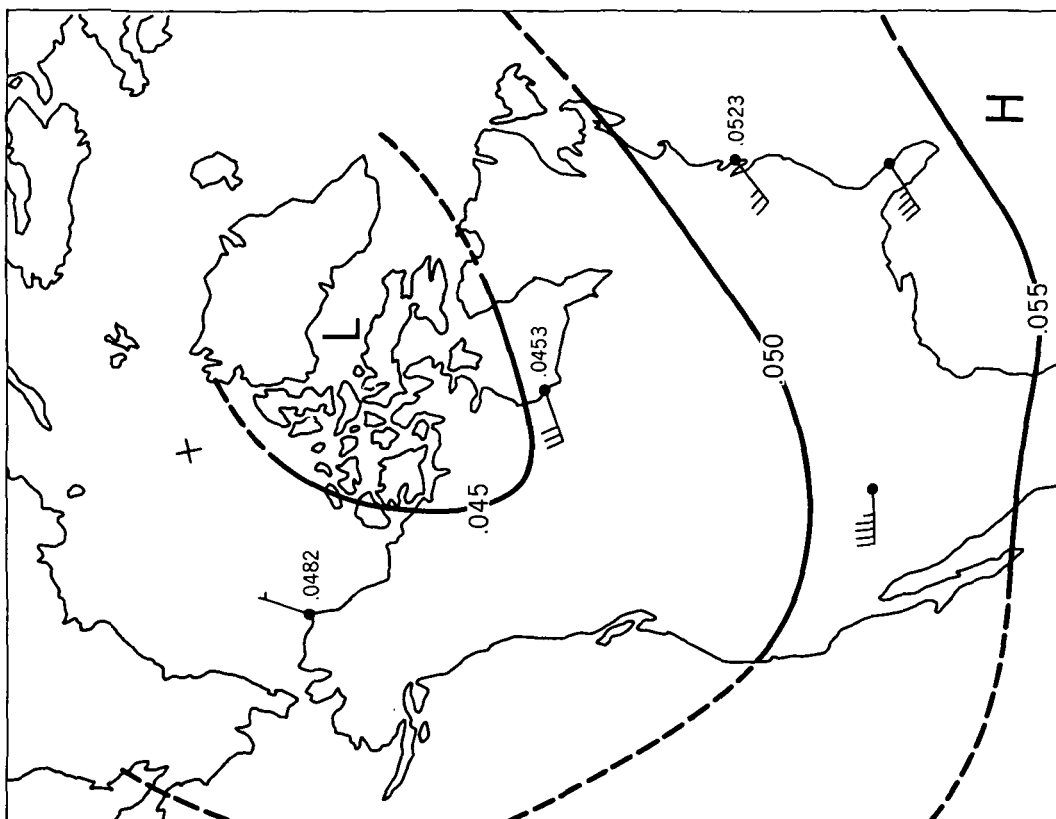


Figure 9(f) —Mean transition (spring/fall) circulation at 70 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

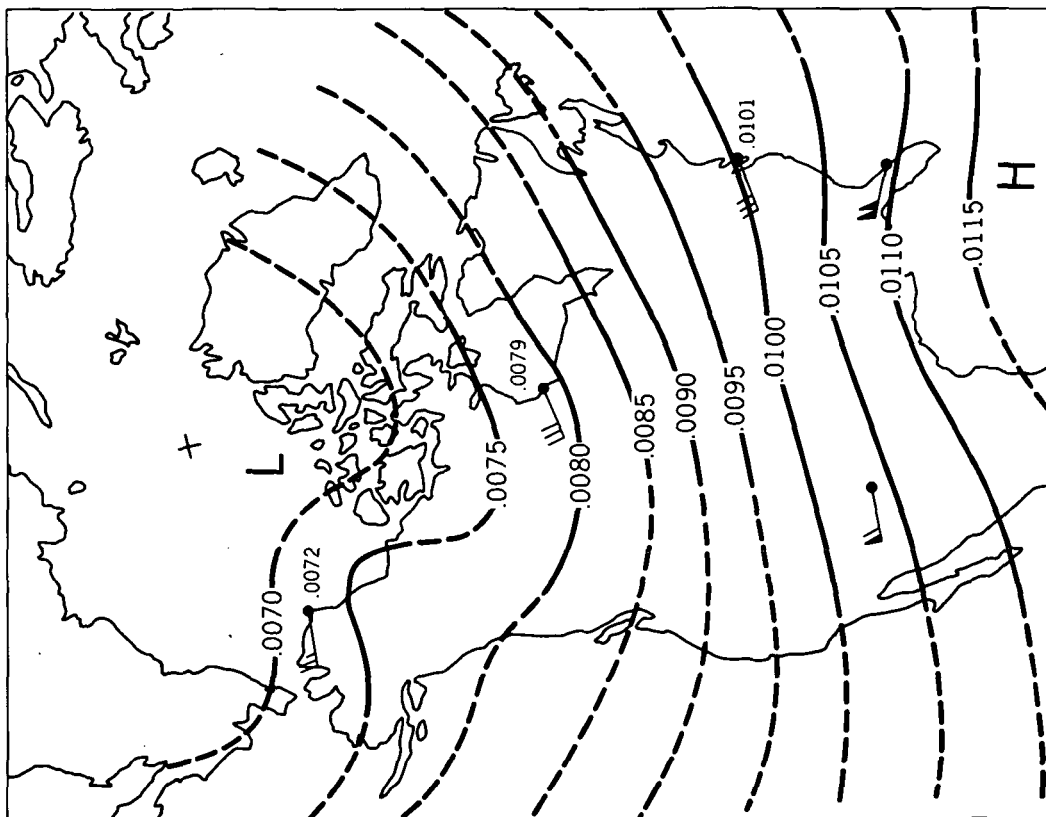


Figure 9(g)—Mean winter circulation at 80 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

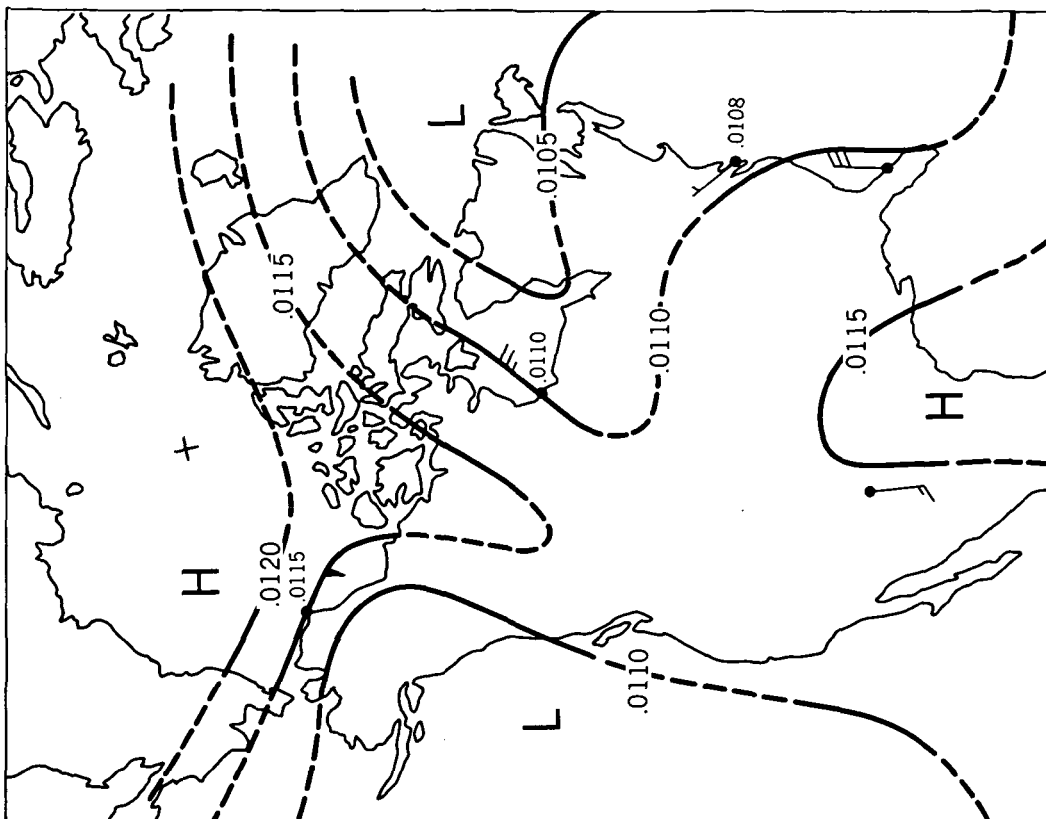


Figure 9(h)—Mean summer circulation at 80 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

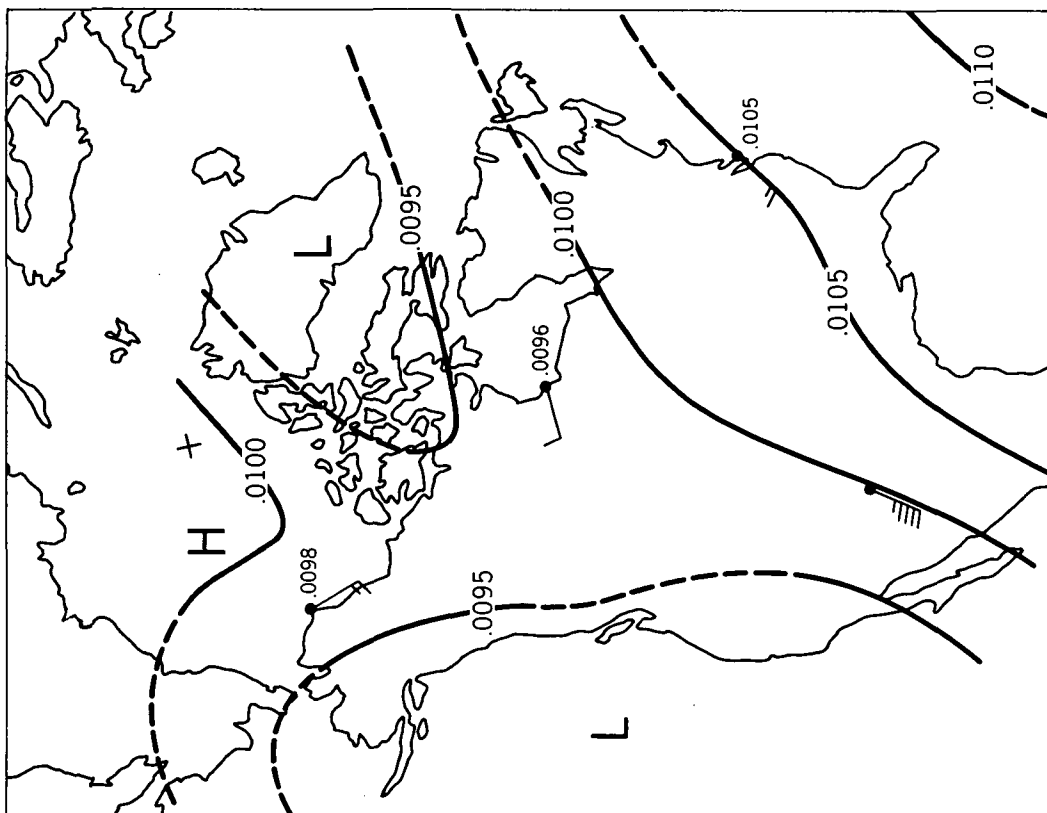


Figure 9(i)—Mean transition (spring/fall) circulation at 80 km. Isobars are given in mb, winds in  $\text{m}\cdot\text{s}^{-1}$ .

Figure 9(e) shows that the mean summer circulation at 70 km is dominated by the same anticyclone observed at 60 km in summer, and, as a result, easterly winds prevail over the entire North American continent. Again, the center of this high pressure system appears to be located south of the geographic pole.

A weak vortex governs the mean flow at 70 km during the months of transition, as shown in Figure 9(f). The circulation is predominately westerly, with light wind speeds north of Wallops and moderate speeds along the southern United States. Pressure values are higher than those observed in winter but below the summer values, as was the case at 60 km.

Figure 9(g) shows the mean winter circulation at 80 km. This coherent circulation is somewhat unexpected since the data from individual soundings fluctuate widely. The averaging process appears to filter out most of the amplitudes which are normally comparable to geostrophic considerations. The prevailing drift, in this case, the vortex generated westerlies, remains essentially intact. Even in this so-called mean flow, there is some indication that the effect of large fluctuations are not removed entirely. The ridging over eastern Alaska, which produces a southerly wind over Barrow, and the divergent flow between Wallops Island and Cape Kennedy are two good examples of such fluctuations.

The mean summer and transition circulations at 80 km, shown in Figures 9(h) and 9(i), represent vastly different circulations than were seen at lower levels. The high pressure region to the north of the continent still exists in summer, but ridging appears across the center of the continent in a north-south direction, producing a seemingly chaotic circulation. Low pressure regions extend onshore from both the Atlantic and Pacific Oceans, and the flow is generally light (except at Barrow in the summer). The transition circulation exhibits a mixture of features from the winter and summer regimes. It is presented only to demonstrate that the simple flow patterns no longer exist. The appearance of these maps may result from the breakdown of the geostrophic assumption at these altitudes. If tides and/or gravity waves dominate the flow, then large accelerations occur, and the geostrophic balance no longer applies. Averaging a sample of this small size may not adequately remove short term influences since the variability of the individual soundings about the mean is quite large. In any case, Figures 9(h) and 9(i) may not represent true mean circulations. Nevertheless, these analyses are included because they point out the problems that exist in determining the mean circulation at 80 km and above.

## CONCLUSION

The data observed during the years 1960 through 1969 have been compiled into mean profiles of temperature, pressure, density, and wind for each of several sites representing various latitudes and climatic regimes. Cross sections and maps have been prepared from the mean data in the hope that these will be of some value to those interested in the mesosphere. While it is recognized that these analyses contain certain shortcomings, primarily the scarcity of data, they are presented as a first approximation to the real atmosphere to point out certain unrealistic features of the standard models.

## ACKNOWLEDGMENT

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National Aeronautics and Space Administration  
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607-12-01-01-51

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## Appendix A

The annual mean temperature, pressure, and density profiles for Natal-Ascension and seasonal mean profiles for Wallops Island, Churchill, and Barrow, along with the corresponding wind parameters and error analyses for temperature and wind, are tabulated in the following tables [comparisons are made with values from “U.S. Standard Atmosphere, 1962” (Reference 2)] :

Table	Station	Data	Page
A.1	Natal-Ascension	Annual	36
A.2(a)	Wallops Island	Winter	38
A.2(b)		Summer	40
A.2(c)		Spring/Fall	42
A.3(a)	Churchill	Winter	44
A.3(b)		Summer	46
A.3(c)		Spring/Fall	48
A.4(a)	Barrow	Winter	50
A.4(b)		Summer	52
A.4(c)		Spring/Fall	54

Table A.1.

ANNUAL MEAN PROFILE  
NATAL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/SQ M				KG/CU M				
25000	218.1	5.3	-1.5		0.247E 04	0.524E 02	-2.8		0.395E-01	0.606E-03	-1.3		3
26000	223.6	3.9	0.4		0.212E 04	0.492E 02	-2.8		0.331E-01	0.465E-03	-3.2		3
27000	230.8	0.9	3.2		0.183E 04	0.368E 02	-2.4		0.276E-01	0.534E-03	-5.5		3
28000	235.3	1.3	4.8		0.157E 04	0.310E 02	-2.4		0.233E-01	0.703E-03	-6.9		3
29000	236.1	2.4	4.7		0.137E 04	0.326E 02	-1.4		0.202E-01	0.410E-03	-5.9		3
30000	237.0	3.0	4.6		0.119E 04	0.244E 02	-0.5		0.174E-01	0.222E-03	-5.0		3
31000	236.6	4.3	3.9		0.103E 04	0.244E 02	-0.0		0.151E-01	0.127E-03	-3.9		3
32000	239.4	5.5	4.7		0.875E 03	0.337E 02	-1.5		0.127E-01	0.558E-03	-6.0		5
33000	241.1	5.2	4.3		0.762E 03	0.282E 02	-0.6		0.110E-01	0.423E-03	-4.7		5
34000	242.2	4.9	3.6		0.666E 03	0.225E 02	0.5		0.959E-02	0.344E-03	-2.9		7
35000	244.0	5.1	3.2		0.575E 03	0.320E 02	0.1		0.821E-02	0.428E-03	-2.9		9
36000	244.7	4.4	2.2		0.509E 03	0.205E 02	2.3		0.726E-02	0.300E-03	0.0		23
37000	247.2	4.1	2.1		0.448E 03	0.188E 02	3.0		0.628E-02	0.236E-03	0.8		30
38000	250.1	3.9	2.2		0.390E 03	0.148E 02	3.5		0.543E-02	0.202E-03	1.3		31
39000	252.9	3.9	2.1		0.341E 03	0.131E 02	3.8		0.470E-02	0.181E-03	1.6		32
40000	255.6	4.7	2.1		0.298E 03	0.116E 02	3.9		0.406E-02	0.162E-03	1.7		33
41000	258.5	4.6	2.1		0.261E 03	0.103E 02	4.2		0.352E-02	0.142E-03	2.0		33
42000	261.1	4.6	2.0		0.229E 03	0.920E 01	4.4		0.306E-02	0.132E-03	2.4		34
43000	263.1	4.7	1.7		0.202E 03	0.786E 01	4.8		0.267E-02	0.113E-03	3.0		34
44000	265.0	5.1	1.3		0.177E 03	0.721E 01	4.9		0.233E-02	0.103E-03	3.5		34
45000	266.9	5.7	1.0		0.155E 03	0.616E 01	5.1		0.204E-02	0.925E-04	4.1		34
46000	268.2	5.8	0.5		0.138E 03	0.550E 01	5.2		0.179E-02	0.781E-04	4.7		34
47000	269.2	5.8	-0.1		0.122E 03	0.483E 01	5.3		0.157E-02	0.672E-04	5.5		34
48000	269.4	5.6	-0.4		0.107E 03	0.424E 01	5.2		0.139E-02	0.564E-04	5.7		34
49000	269.2	5.3	-0.5		0.949E 02	0.396E 01	5.1		0.122E-02	0.504E-04	5.6		34
50000	268.4	5.6	-0.8		0.838E 02	0.348E 01	5.1		0.108E-02	0.448E-04	6.0		33
51000	267.5	6.1	-1.1		0.740E 02	0.316E 01	5.0		0.963E-03	0.398E-04	6.2		33
52000	266.1	6.3	-1.6		0.652E 02	0.281E 01	4.8		0.853E-03	0.353E-04	6.6		33
53000	264.6	5.9	-1.8		0.574E 02	0.245E 01	4.6		0.756E-03	0.305E-04	6.5		33
54000	262.4	4.1	-1.9		0.505E 02	0.222E 01	4.2		0.671E-03	0.274E-04	6.3		33
55000	260.4	3.1	-1.9		0.444E 02	0.194E 01	4.0		0.594E-03	0.256E-04	6.0		33
56000	258.7	4.0	-1.8		0.390E 02	0.170E 01	3.7		0.526E-03	0.240E-04	5.7		33
57000	256.7	4.7	-1.8		0.343E 02	0.151E 01	3.5		0.465E-03	0.214E-04	5.5		33
58000	253.9	4.6	-2.2		0.300E 02	0.134E 01	3.2		0.412E-03	0.183E-04	5.6		33
59000	250.6	4.8	-2.7		0.263E 02	0.118E 01	2.9		0.366E-03	0.161E-04	5.8		33
60000	247.0	6.1	-3.4		0.230E 02	0.106E 01	2.5		0.324E-03	0.155E-04	6.2		33
61000	243.3	6.6	-4.1		0.200E 02	0.933E 00	2.0		0.287E-03	0.143E-04	6.5		33
62000	239.7	6.7	-4.4		0.174E 02	0.846E 00	1.4		0.254E-03	0.129E-04	6.2		33
63000	235.9	6.6	-4.5		0.152E 02	0.761E 00	0.8		0.224E-03	0.112E-04	5.6		33
64000	232.7	6.7	-4.3		0.131E 02	0.662E 00	0.0		0.197E-03	0.941E-05	4.5		33
65000	229.5	6.9	-4.0		0.113E 02	0.591E 00	-0.6		0.172E-03	0.803E-05	3.6		33
66000	226.0	7.3	-3.9		0.982E 01	0.534E 00	-1.1		0.151E-03	0.711E-05	2.9		33
67000	222.4	8.2	-3.8		0.845E 01	0.496E 00	-1.7		0.132E-03	0.681E-05	2.2		32
68000	219.2	8.4	-3.6		0.726E 01	0.446E 00	-2.3		0.115E-03	0.627E-05	1.3		32
69000	215.7	8.6	-3.5		0.622E 01	0.398E 00	-2.9		0.100E-03	0.576E-05	0.6		32
70000	212.3	9.2	-3.3		0.532E 01	0.358E 00	-3.4		0.874E-04	0.555E-05	-0.1		32
71000	209.4	9.6	-2.9		0.454E 01	0.315E 00	-3.9		0.756E-04	0.526E-05	-0.9		32
72000	207.0	9.4	-2.3		0.387E 01	0.280E 00	-4.3		0.652E-04	0.490E-05	-1.9		31
73000	204.5	8.9	-1.6		0.329E 01	0.243E 00	-4.6		0.561E-04	0.448E-05	-2.9		31
74000	202.4	9.2	-0.8		0.279E 01	0.209E 00	-4.8		0.482E-04	0.413E-05	-3.8		31
75000	201.1	9.8	0.4		0.236E 01	0.178E 00	-4.7		0.410E-04	0.353E-05	-5.2		31
76000	199.8	10.1	1.8		0.200E 01	0.152E 00	-4.7		0.350E-04	0.286E-05	-6.2		31
77000	198.6	10.2	3.2		0.169E 01	0.134E 00	-4.3		0.297E-04	0.223E-05	-7.2		31
78000	197.9	11.3	5.0		0.143E 01	0.120E 00	-3.8		0.252E-04	0.185E-05	-8.3		30
79000	198.2	10.5	7.4		0.120E 01	0.107E 00	-2.8		0.212E-04	0.153E-05	-9.5		30

80000	199.1	9.8	10.1	0.102E 01	0.963E-01	-1.3	0.178E-04	0.139E-05	-10.4	30
81000	199.4	9.8	10.3	0.865E 00	0.847E-01	0.3	0.151E-04	0.134E-05	-9.0	30
82000	200.1	10.8	10.7	0.732E 00	0.739E-01	2.1	0.127E-04	0.124E-05	-7.6	30
83000	200.7	10.7	11.0	0.619E 00	0.644E-01	3.9	0.107E-04	0.109E-05	-6.3	30
84000	201.6	11.7	11.6	0.525E 00	0.565E-01	5.9	0.909E-05	0.961E-06	-4.9	30
85000	201.2	12.6	11.3	0.445E 00	0.493E-01	7.9	0.772E-05	0.790E-06	-2.9	30
86000	200.4	15.1	10.9	0.377E 00	0.433E-01	9.9	0.656E-05	0.672E-06	-0.7	30
87000	200.1	16.6	10.7	0.319E 00	0.387E-01	11.9	0.555E-05	0.583E-06	1.1	30
88000	199.5	16.4	10.4	0.270E 00	0.349E-01	13.7	0.472E-05	0.524E-06	3.1	29
89000	198.3	17.2	9.7	0.228E 00	0.313E-01	15.6	0.402E-05	0.474E-06	5.5	29
90000	195.0	20.6	7.9	0.193E 00	0.286E-01	17.4	0.345E-05	0.426E-06	9.1	29
91000	193.1	23.8	5.1	0.163E 00	0.262E-01	19.3	0.296E-05	0.408E-06	14.1	25
92000	196.2	24.4	5.1	0.140E 00	0.245E-01	23.0	0.251E-05	0.358E-06	17.4	21
93000	194.0	21.2	2.3	0.119E 00	0.229E-01	24.2	0.213E-05	0.302E-06	21.2	18
94000	194.2	27.1	0.8	0.106E 00	0.228E-01	32.1	0.190E-05	0.252E-06	30.4	12
95000	204.8	31.2	4.7	0.101E 00	0.211E-01	48.6	0.171E-05	0.226E-06	41.5	7
96000	201.0	36.0	1.2	0.809E-01	0.164E-01	40.8	0.140E-05	0.148E-06	38.9	6
97000	205.9	41.9	2.2	0.710E-01	0.163E-01	45.7	0.119E-05	0.134E-06	42.0	5
98000	196.8	43.2	-3.6	0.561E-01	0.171E-01	35.7	0.977E-06	0.157E-06	38.7	3
99000	197.2	44.3	-4.7	0.475E-01	0.158E-01	34.7	0.822E-06	0.160E-06	39.1	3
100000	195.5	43.7	-4.9	0.402E-01	0.145E-01	33.7	0.686E-06	0.159E-06	38.0	3
101000	218.4	46.5	1.6	0.427E-01	0.820E-02	65.8	0.684E-06	0.150E-07	64.4	2
102000	221.1	50.8	0.6	0.368E-01	0.843E-02	66.5	0.580E-06	0.554E-09	66.2	2
103000	224.3	54.4	-0.0	0.316E-01	0.834E-02	65.9	0.488E-06	0.110E-07	65.9	2
104000	226.5	55.5	-1.1	0.274E-01	0.819E-02	66.0	0.415E-06	0.243E-07	66.7	2
105000	230.3	56.8	-1.5	0.236E-01	0.769E-02	64.8	0.349E-06	0.301E-07	65.1	2
106000	291.1	0.0	22.0	0.280E-01	0.000E 00	124.7	0.335E-06	0.000E 00	85.7	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# ANNUAL MEAN PROFILE

## NATAL

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	NO OBS	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
30000	-10.7	9.1	10.7	88.8	3	0.0	0.0	0	0.5	0.2
35000	-7.4	15.8	7.4	95.3	27	2.4	1.8	3	0.7	0.9
40000	4.0	22.9	4.2	251.6	29	3.1	2.5	3	1.1	1.0
45000	1.8	30.2	2.1	238.7	43	5.3	4.1	5	2.2	2.3
50000	8.2	25.4	8.5	256.2	34	9.5	7.3	4	2.1	1.4
55000	19.4	20.3	19.7	278.4	44	11.2	9.4	5	2.7	1.9
60000	28.6	20.7	28.6	270.2	39	16.6	14.0	4	3.3	2.1
65000	23.3	16.2	24.2	285.5	33	12.7	12.5	3	2.9	2.2
70000	6.1	27.3	6.1	278.6	40	10.4	9.6	6	2.8	2.1
75000	-5.1	34.7	5.1	84.1	32	11.6	10.4	3	3.3	2.2
80000	-13.3	30.3	13.4	86.0	40	14.8	12.7	5	4.4	2.9
85000	-1.3	42.4	4.2	18.0	52	27.0	23.4	7	6.3	3.8
90000	-35.6	79.1	39.9	63.1	39	35.5	31.7	6	8.9	6.1
95000	-9.3	0.0	29.1	18.6	1	0.0	0.0	0	40.7	0.0

Table A.2(a).

SEASONAL MEAN PROFILE  
WALLOPS WINTER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	NT/50 M	PCT	DIF	MEAN	KG/CU M	ST DEV	PCT	DIF
33000	233.4	7.9	1.0		0.722E 03	0.939E 01	-5.9		0.107E-01	0.326E-03		-6.7	5
34000	236.7	6.1	1.2		0.640E 03	0.274E 02	-3.4		0.942E-02	0.420E-03		-4.6	10
35000	239.8	6.1	1.4		0.550E 03	0.255E 02	-4.1		0.800E-02	0.361E-03		-5.4	13
36000	243.7	6.0	1.8		0.479E 03	0.210E 02	-3.8		0.685E-02	0.312E-03		-5.5	15
37000	248.0	6.8	2.4		0.418E 03	0.180E 02	-3.4		0.587E-02	0.277E-03		-5.7	16
38000	250.1	7.6	2.2		0.365E 03	0.163E 02	-3.1		0.508E-02	0.237E-03		-5.2	18
39000	252.5	6.8	2.0		0.318E 03	0.143E 02	-3.0		0.439E-02	0.207E-03		-4.9	19
40000	253.8	7.1	1.3		0.276E 03	0.135E 02	-3.5		0.380E-02	0.180E-03		-4.8	21
41000	255.1	8.0	0.8		0.241E 03	0.122E 02	-3.9		0.329E-02	0.155E-03		-4.6	23
42000	256.4	9.4	0.2		0.209E 03	0.115E 02	-4.5		0.285E-02	0.141E-03		-4.7	25
43000	260.0	9.1	0.5		0.185E 03	0.110E 02	-4.0		0.248E-02	0.128E-03		-4.5	27
44000	262.6	9.1	0.4		0.162E 03	0.103E 02	-4.3		0.215E-02	0.112E-03		-4.7	28
45000	265.0	9.6	0.3		0.142E 03	0.948E 01	-4.2		0.187E-02	0.107E-03		-4.5	28
46000	267.3	11.0	0.1		0.125E 03	0.863E 01	-4.2		0.163E-02	0.102E-03		-4.3	28
47000	268.2	10.7	-0.5		0.110E 03	0.783E 01	-4.3		0.143E-02	0.955E-04		-3.8	28
48000	267.7	9.4	-1.0		0.977E 02	0.710E 01	-4.4		0.127E-02	0.848E-04		-3.4	28
49000	266.0	7.5	-1.7		0.861E 02	0.637E 01	-4.6		0.112E-02	0.764E-04		-3.0	28
50000	264.0	7.6	-2.4		0.758E 02	0.572E 01	-4.9		0.100E-02	0.721E-04		-2.5	28
51000	262.2	9.0	-3.1		0.667E 02	0.512E 01	-5.2		0.887E-03	0.681E-04		-2.1	28
52000	260.7	9.4	-3.6		0.586E 02	0.457E 01	-5.6		0.784E-03	0.595E-04		-2.0	28
53000	259.0	9.4	-3.8		0.515E 02	0.409E 01	-6.1		0.693E-03	0.526E-04		-2.3	28
54000	257.0	9.5	-3.9		0.452E 02	0.366E 01	-6.6		0.613E-03	0.478E-04		-2.8	28
55000	254.9	10.4	-4.0		0.396E 02	0.326E 01	-7.1		0.542E-03	0.444E-04		-3.2	28
56000	251.9	10.6	-4.4		0.347E 02	0.290E 01	-7.7		0.480E-03	0.419E-04		-3.3	28
57000	249.0	10.6	-4.8		0.303E 02	0.256E 01	-8.3		0.425E-03	0.386E-04		-3.5	28
58000	246.6	9.8	-5.0		0.265E 02	0.224E 01	-9.0		0.375E-03	0.347E-04		-4.0	28
59000	244.6	8.7	-5.0		0.231E 02	0.195E 01	-9.6		0.329E-03	0.308E-04		-4.6	28
60000	242.5	8.0	-5.1		0.201E 02	0.169E 01	-10.3		0.289E-03	0.274E-04		-5.2	28
61000	240.3	8.2	-5.2		0.175E 02	0.145E 01	-11.0		0.254E-03	0.245E-04		-5.9	28
62000	238.3	8.6	-5.0		0.152E 02	0.125E 01	-11.7		0.222E-03	0.217E-04		-6.8	28
63000	236.5	9.1	-4.2		0.132E 02	0.105E 01	-12.3		0.195E-03	0.190E-04		-8.2	28
64000	234.4	8.9	-3.5		0.114E 02	0.913E 00	-12.8		0.170E-03	0.163E-04		-9.4	28
65000	232.5	9.1	-2.8		0.992E 01	0.779E 00	-13.3		0.149E-03	0.140E-04		-10.5	28
66000	230.3	10.1	-2.1		0.858E 01	0.667E 00	-13.6		0.130E-03	0.123E-04		-11.5	28
67000	227.7	11.2	-1.5		0.741E 01	0.573E 00	-13.9		0.113E-03	0.106E-04		-12.2	28
68000	224.1	10.9	-1.4		0.639E 01	0.495E 00	-14.1		0.995E-04	0.908E-05		-12.6	28
69000	221.2	10.4	-1.0		0.549E 01	0.428E 00	-14.3		0.868E-04	0.794E-05		-13.1	28
70000	219.5	9.8	-0.0		0.472E 01	0.367E 00	-14.4		0.751E-04	0.700E-05		-14.1	28
71000	218.5	11.4	1.2		0.405E 01	0.311E 00	-14.4		0.647E-04	0.656E-05		-15.2	28
72000	219.6	13.0	3.6		0.346E 01	0.265E 00	-14.3		0.552E-04	0.562E-05		-17.0	27
73000	220.7	14.3	6.1		0.297E 01	0.228E 00	-13.8		0.471E-04	0.462E-05		-18.4	27
74000	220.1	15.5	7.8		0.254E 01	0.195E 00	-13.3		0.404E-04	0.386E-05		-19.3	25
75000	220.6	17.5	10.2		0.218E 01	0.175E 00	-12.2		0.346E-04	0.319E-05		-20.0	25
76000	218.3	17.1	11.3		0.186E 01	0.142E 00	-11.5		0.298E-04	0.260E-05		-20.2	24
77000	216.6	16.6	12.6		0.159E 01	0.125E 00	-10.0		0.257E-04	0.208E-05		-19.8	24
78000	215.4	14.7	14.3		0.137E 01	0.107E 00	-7.6		0.222E-04	0.172E-05		-18.9	21
79000	216.0	14.1	17.1		0.118E 01	0.101E 00	-5.1		0.190E-04	0.169E-05		-18.8	19
80000	212.9	13.1	17.8		0.101E 01	0.874E-01	-2.0		0.166E-04	0.154E-05		-16.6	18
81000	211.5	13.4	17.0		0.871E 00	0.814E-01	1.1		0.144E-04	0.155E-05		-13.3	16
82000	210.7	14.0	16.6		0.743E 00	0.701E-01	3.7		0.123E-04	0.134E-05		-10.6	16
83000	209.1	13.8	15.7		0.634E 00	0.606E-01	6.3		0.105E-04	0.109E-05		-7.8	16
84000	205.8	15.5	13.9		0.539E 00	0.530E-01	8.8		0.916E-05	0.962E-06		-4.1	16
85000	204.4	13.8	13.1		0.449E 00	0.514E-01	9.0		0.766E-05	0.705E-06		-3.6	11
86000	200.4	12.6	10.9		0.377E 00	0.464E-01	10.1		0.656E-05	0.638E-06		-0.8	10
87000	197.0	13.2	9.0		0.316E 00	0.420E-01	10.7		0.559E-05	0.649E-06		1.6	9

88000	198.0	8.3	9.5	0.275E 00	0.377E-01	15.8	0.484E-05	0.677E-06	5.8	7
89000	199.3	14.8	10.3	0.227E 00	0.319E-01	15.3	0.401E-05	0.666E-06	5.2	6
90000	204.1	22.0	12.9	0.193E 00	0.263E-01	17.5	0.333E-05	0.600E-06	5.3	6
91000	194.4	7.6	5.9	0.152E 00	0.843E-03	11.1	0.273E-05	0.917E-07	5.1	2
92000	194.4	7.8	4.2	0.128E 00	0.103E-02	12.3	0.250E-05	0.750E-07	7.9	2
93000	188.0	3.2	-0.7	0.107E 00	0.124E-02	12.4	0.199E-05	0.112E-07	13.3	2
94000	182.4	0.0	-5.2	0.890E-01	0.000E 00	10.4	0.170E-05	0.000E 00	16.5	1
95000	177.3	0.0	-9.3	0.738E-01	0.000E 00	8.6	0.145E-05	0.000E 00	19.8	1
96000	172.1	0.0	-13.2	0.612E-01	0.000E 00	6.6	0.124E-05	0.000E 00	23.0	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

WALLOPS WINTER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR		SOUTH ERROR M/SEC MEAN ST DEV	NO OBS	TEMP ERROR		NO OBS
	MEAN	ST DEV	MEAN	ST DEV				MEAN	ST DEV			MEAN	ST DEV	
30000	38.4	19.2	4.0	11.8	38.6	263.9	13	0.6	0.2	1.1	0.1	1.4	3.0	11
35000	46.8	29.0	3.9	14.1	47.0	265.2	20	0.7	0.3	1.2	0.3	2.7	3.5	17
40000	56.7	34.5	11.1	14.8	57.8	258.9	29	1.1	0.3	1.9	0.6	2.8	3.1	22
45000	65.5	34.6	12.7	18.1	66.7	258.9	34	1.6	0.3	2.2	0.3	2.6	3.5	27
50000	65.7	38.3	12.5	19.6	66.9	259.1	33	1.5	0.3	2.3	0.5	2.9	3.2	26
55000	63.3	34.5	16.4	20.6	65.4	255.4	33	1.7	0.4	2.5	0.5	2.7	3.1	27
60000	67.7	33.5	8.6	25.2	68.3	262.7	32	1.6	0.4	2.5	0.6	3.3	4.7	25
65000	66.6	42.7	0.0	26.4	66.6	269.9	34	1.5	0.3	2.2	0.3	3.6	5.7	27
70000	43.8	45.5	6.3	24.2	44.3	261.7	31	2.1	0.4	3.1	0.5	2.9	4.0	24
75000	64.6	38.6	8.6	46.3	65.2	262.3	37	2.8	0.6	4.2	0.8	4.6	7.5	32
80000	26.9	34.3	-4.4	50.3	27.3	279.3	32	9.4	17.2	15.3	31.9	5.1	7.8	29
85000	8.2	28.6	4.2	62.2	9.2	242.8	17	23.2	48.2	25.4	48.7	6.5	10.8	16
90000	3.5	41.6	-43.8	130.2	44.0	355.3	8	9.1	1.9	10.4	2.7	4.8	4.9	7
95000	-29.2	0.0	-9.6	0.0	30.8	71.6	1	125.5	0.0	200.3	0.0	19.2	0.0	1

Table A.2(b).

SEASONAL MEAN PROFILE

WALLOPS SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/SQ M	MEAN	ST DEV	PCT DIF	KG/CU M	
25000	223.0	2.0	0.6		0.273E 04	0.200E 02	7.1		0.426E-01	0.694E-03	6.4		2
26000	223.9	1.4	0.6		0.234E 04	0.200E 02	6.9		0.354E-01	0.546E-03	6.2		2
27000	223.9	1.0	0.1		0.204E 04	0.374E 02	8.5		0.317E-01	0.698E-03	8.3		3
28000	226.3	0.9	0.8		0.175E 04	0.286E 02	8.4		0.269E-01	0.369E-03	7.6		3
29000	226.8	3.2	0.5		0.151E 04	0.244E 02	8.6		0.231E-01	0.390E-03	7.9		3
30000	228.6	2.8	0.9		0.130E 04	0.216E 02	8.6		0.158E-01	0.255E-03	7.5		3
31000	228.1	4.4	0.2		0.112E 04	0.262E 02	8.9		0.171E-01	0.339E-03	8.6		3
32000	230.2	5.5	0.7		0.968E 03	0.196E 02	8.9		0.146E-01	0.385E-03	8.1		4
33000	234.3	8.2	1.4		0.856E 03	0.452E 02	11.6		0.127E-01	0.439E-03	9.9		6
34000	235.8	8.3	0.9		0.741E 03	0.422E 02	11.7		0.109E-01	0.407E-03	10.7		6
35000	239.4	7.8	1.2		0.646E 03	0.364E 02	12.4		0.939E-02	0.343E-03	11.0		7
36000	243.0	7.2	1.5		0.567E 03	0.359E 02	13.9		0.813E-02	0.346E-03	12.1		8
37000	246.5	7.9	1.8		0.496E 03	0.316E 02	14.6		0.701E-02	0.299E-03	12.4		9
38000	248.2	8.2	1.4		0.429E 03	0.303E 02	13.9		0.602E-02	0.275E-03	12.2		10
39000	252.4	6.2	1.9		0.375E 03	0.264E 02	14.1		0.517E-02	0.268E-03	11.8		11
40000	252.2	6.1	1.9		0.325E 03	0.219E 02	13.4		0.444E-02	0.245E-03	11.1		14
41000	258.1	7.1	2.0		0.284E 03	0.192E 02	13.4		0.384E-02	0.225E-03	11.1		15
42000	261.1	8.6	2.0		0.250E 03	0.167E 02	13.6		0.333E-02	0.202E-03	11.4		16
43000	263.2	9.3	1.7		0.219E 03	0.151E 02	13.8		0.290E-02	0.177E-03	11.9		16
44000	264.1	6.4	1.0		0.192E 03	0.133E 02	14.4		0.254E-02	0.138E-03	12.5		18
45000	265.7	6.8	0.5		0.170E 03	0.119E 02	14.4		0.223E-02	0.119E-03	13.7		21
46000	268.5	8.7	-0.1		0.150E 03	0.102E 02	14.2		0.196E-02	0.109E-03	14.3		24
47000	266.8	11.9	-1.0		0.132E 03	0.944E 01	14.0		0.172E-02	0.108E-03	15.3		24
48000	266.5	14.6	-1.5		0.116E 03	0.876E 01	13.8		0.152E-02	0.104E-03	15.7		24
49000	267.1	11.2	-1.3		0.102E 03	0.810E 01	13.6		0.133E-02	0.843E-04	15.1		24
50000	267.1	8.1	-1.3		0.905E 02	0.740E 01	13.4		0.117E-02	0.781E-04	14.8		24
51000	266.7	6.0	-1.4		0.798E 02	0.672E 01	13.2		0.104E-02	0.770E-04	14.8		24
52000	265.7	6.3	-1.8		0.703E 02	0.598E 01	13.0		0.922E-03	0.760E-04	15.1		24
53000	264.0	7.3	-2.0		0.619E 02	0.531E 01	12.6		0.817E-03	0.710E-04	15.1		24
54000	262.2	7.8	-2.0		0.544E 02	0.469E 01	12.3		0.724E-03	0.653E-04	14.7		24
55000	260.5	8.5	-1.8		0.479E 02	0.409E 01	12.0		0.641E-03	0.593E-04	14.3		24
56000	258.3	9.0	-1.9		0.420E 02	0.358E 01	11.7		0.568E-03	0.536E-04	14.1		24
57000	255.4	9.8	-2.3		0.369E 02	0.312E 01	11.3		0.504E-03	0.483E-04	14.2		24
58000	251.9	10.2	-2.9		0.323E 02	0.273E 01	10.9		0.447E-03	0.427E-04	14.5		24
59000	248.3	9.6	-3.6		0.282E 02	0.236E 01	10.4		0.397E-03	0.369E-04	14.7		24
60000	244.6	9.6	-4.3		0.246E 02	0.206E 01	9.7		0.351E-03	0.320E-04	14.9		24
61000	240.5	9.6	-5.2		0.214E 02	0.180E 01	8.8		0.310E-03	0.276E-04	15.0		24
62000	236.7	9.4	-5.6		0.186E 02	0.156E 01	7.9		0.274E-03	0.242E-04	14.6		24
63000	233.1	8.4	-5.6		0.161E 02	0.136E 01	7.0		0.241E-03	0.210E-04	13.6		24
64000	229.5	7.6	-5.6		0.139E 02	0.118E 01	6.2		0.212E-03	0.185E-04	12.6		24
65000	225.9	7.0	-5.5		0.120E 02	0.101E 01	5.2		0.185E-03	0.162E-04	11.5		24
66000	222.6	6.8	-5.4		0.103E 02	0.878E 00	4.4		0.162E-03	0.146E-04	10.5		24
67000	219.4	7.0	-5.1		0.895E 01	0.762E 00	4.0		0.142E-03	0.134E-04	9.8		23
68000	215.7	7.4	-5.1		0.768E 01	0.648E 00	3.1		0.124E-03	0.117E-04	8.9		23
69000	212.0	7.6	-5.1		0.656E 01	0.551E 00	2.2		0.107E-03	0.100E-04	7.9		23
70000	208.4	8.4	-5.1		0.559E 01	0.470E 00	1.4		0.936E-04	0.855E-05	7.0		23
71000	205.6	9.4	-4.7		0.476E 01	0.407E 00	0.5		0.807E-04	0.742E-05	5.6		23
72000	203.9	10.2	-3.7		0.404E 01	0.352E 00	-0.1		0.691E-04	0.623E-05	3.9		23
73000	203.3	10.6	-2.2		0.343E 01	0.308E 00	-0.6		0.588E-04	0.506E-05	1.7		23
74000	203.3	11.0	-0.3		0.291E 01	0.271E 00	-0.9		0.498E-04	0.422E-05	-0.5		23
75000	202.8	11.4	1.3		0.246E 01	0.238E 00	-0.9		0.424E-04	0.376E-05	-2.1		23
76000	202.2	12.7	3.0		0.210E 01	0.208E 00	-0.1		0.362E-04	0.354E-05	-2.9		22
77000	201.9	13.3	5.0		0.179E 01	0.170E 00	1.4		0.310E-04	0.308E-05	-3.1		21
78000	200.4	14.9	6.4		0.150E 01	0.125E 00	1.0		0.262E-04	0.224E-05	-4.6		20
79000	196.9	13.2	6.7		0.127E 01	0.110E 00	2.8		0.226E-04	0.173E-05	-3.5		19

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	NO OBS	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
30000	-15.7	1.4	15.7	83.4	3	1.0	2.0	1	0.7	3
31000	-27.7	7.1	27.7	89.7	10	0.8	0.2	4	0.8	7
32000	-33.3	12.8	34.0	78.0	16	1.1	0.2	4	0.9	1.1
33000	-43.2	21.5	43.6	97.4	17	1.4	0.4	3	1.0	1.1
34000	-48.7	11.5	49.1	87.2	23	1.2	0.1	2	1.0	0.9
35000	-50.5	14.8	50.9	86.5	18	1.0	0.2	5	0.9	0.6
36000	-51.2	21.0	51.2	89.4	22	1.4	0.2	5	0.8	0.6
37000	-34.3	23.2	34.8	99.3	20	1.4	0.1	4	1.1	0.8
38000	-13.6	38.6	39.3	96.1	21	2.3	0.6	6	1.1	0.9
39000	0.7	45.1	45.7	347.3	22	2.7	0.9	6	1.6	1.4
40000	12.7	63.4	63.0	341.0	17	2.9	0.7	3	2.6	2.3
41000	29.7	105.6	100.9	314.6	15	5.3	2.5	4	4.4	3.8
42000					11	13.7	5.1	4	8.9	6.5
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PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

WALLOPS SUMMER

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	NO OBS	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
30000	-15.7	1.4	15.7	83.4	3	1.0	2.0	1	0.7	3
31000	-27.7	7.1	27.7	89.7	10	0.8	0.2	4	0.8	7
32000	-33.3	12.8	34.0	78.0	16	1.1	0.2	4	0.9	1.1
33000	-43.2	21.5	43.6	97.4	17	1.4	0.4	3	1.0	1.1
34000	-48.7	11.5	49.1	87.2	23	1.2	0.1	2	1.0	0.9
35000	-50.5	14.8	50.9	86.5	18	1.0	0.2	5	0.9	0.6
36000	-51.2	21.0	51.2	89.4	22	1.4	0.2	5	0.8	0.6
37000	-34.3	23.2	34.8	99.3	20	1.4	0.1	4	1.1	0.8
38000	-13.6	38.6	39.3	96.1	21	2.3	0.6	6	1.1	0.9
39000	0.7	45.1	45.7	347.3	22	2.7	0.9	6	1.6	1.4
40000	12.7	63.4	63.0	341.0	17	2.9	0.7	3	2.6	2.3
41000	29.7	105.6	100.9	314.6	15	5.3	2.5	4	4.4	3.8
42000					11	13.7	5.1	4	8.9	6.5
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Table A.2(c).

SEASONAL MEAN PROFILE  
WALLOPS SPRING/FALL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO DBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/50 M				KG/CU M				
29000	228.3	4.0	1.2		0.144E 04	0.000E 00	3.7		0.220E-01	0.000E 00	2.4		1
30000	226.6	4.5	0.0		0.118E 04	0.621E 02	-1.2		0.181E-01	0.587E-03	-1.3		2
31000	230.7	3.7	1.4		0.104E 04	0.599E 02	1.6		0.158E-01	0.675E-03	0.1		3
32000	233.8	3.1	2.3		0.905E 03	0.542E 02	1.8		0.134E-01	0.667E-03	-0.5		3
33000	236.1	5.1	2.2		0.786E 03	0.391E 02	2.4		0.115E-01	0.392E-03	0.1		5
34000	238.7	5.1	2.1		0.680E 03	0.324E 02	2.5		0.992E-01	0.461E-03	0.4		10
35000	242.5	5.0	2.5		0.593E 03	0.257E 02	3.3		0.832E-02	0.374E-03	0.7		13
36000	246.0	6.3	2.8		0.512E 03	0.271E 02	2.8		0.726E-02	0.397E-03	0.0		19
37000	249.7	6.0	3.1		0.446E 03	0.233E 02	3.0		0.623E-02	0.342E-03	-0.0		20
38000	252.8	6.7	3.2		0.390E 03	0.204E 02	3.5		0.537E-02	0.292E-03	0.2		22
39000	255.5	7.0	3.1		0.341E 03	0.176E 02	3.7		0.465E-02	0.244E-03	0.5		23
40000	258.5	6.8	3.2		0.300E 03	0.168E 02	4.7		0.405E-02	0.209E-03	0.3		23
41000	260.3	7.3	2.8		0.262E 03	0.157E 02	4.7		0.351E-02	0.178E-03	1.7		24
42000	262.3	7.4	2.5		0.230E 03	0.141E 02	4.6		0.305E-02	0.155E-03	2.0		26
43000	263.8	7.9	2.0		0.201E 03	0.148E 02	4.3		0.265E-02	0.152E-03	2.2		31
44000	265.0	7.7	1.3		0.177E 03	0.132E 02	4.5		0.232E-02	0.138E-03	3.0		34
45000	265.0	7.8	0.3		0.155E 03	0.118E 02	4.3		0.204E-02	0.124E-03	3.9		38
46000	265.4	7.8	-0.5		0.136E 03	0.107E 02	4.3		0.179E-02	0.115E-03	4.8		38
47000	266.1	8.1	-1.3		0.120E 03	0.965E 01	4.0		0.157E-02	0.105E-03	5.4		39
48000	266.7	7.7	-1.4		0.106E 03	0.872E 01	3.9		0.138E-02	0.945E-04	5.3		39
49000	266.8	7.9	-1.4		0.932E 02	0.838E 01	3.2		0.121E-02	0.896E-04	4.5		40
50000	266.8	8.3	-1.4		0.822E 02	0.761E 01	3.0		0.107E-02	0.819E-04	4.4		40
51000	266.0	8.4	-1.7		0.724E 02	0.690E 01	2.8		0.947E-03	0.728E-04	4.4		40
52000	264.5	8.0	-2.2		0.638E 02	0.625E 01	2.5		0.839E-03	0.660E-04	4.7		40
53000	262.3	7.7	-2.6		0.561E 02	0.564E 01	2.2		0.744E-03	0.513E-04	4.8		40
54000	260.1	8.1	-2.7		0.493E 02	0.509E 01	1.8		0.660E-03	0.582E-04	4.6		40
55000	258.0	9.2	-2.8		0.433E 02	0.457E 01	1.4		0.585E-03	0.543E-04	4.3		40
56000	256.2	8.7	-2.7		0.380E 02	0.409E 01	1.1		0.517E-03	0.505E-04	3.9		40
57000	254.3	8.1	-2.8		0.333E 02	0.366E 01	0.7		0.457E-03	0.466E-04	3.6		40
58000	251.8	7.4	-3.0		0.292E 02	0.324E 01	0.2		0.404E-03	0.430E-04	3.3		40
59000	249.0	7.1	-3.3		0.255E 02	0.286E 01	-0.1		0.357E-03	0.394E-04	3.3		40
60000	246.4	6.0	-3.6		0.223E 02	0.252E 01	-0.6		0.315E-03	0.347E-04	3.1		40
61000	243.6	5.1	-4.0		0.194E 02	0.221E 01	-1.1		0.278E-03	0.304E-04	2.9		40
62000	241.0	4.5	-3.9		0.169E 02	0.196E 01	-1.5		0.245E-03	0.271E-04	2.4		39
63000	238.8	5.0	-3.3		0.148E 02	0.171E 01	-1.8		0.215E-03	0.236E-04	1.5		40
64000	236.1	4.6	-2.9		0.124E 02	0.150E 01	-2.2		0.189E-03	0.211E-04	0.6		40
65000	233.3	4.7	-2.4		0.111E 02	0.130E 01	-2.6		0.166E-03	0.191E-04	-0.2		40
66000	230.8	5.0	-1.9		0.964E 01	0.114E 01	-2.9		0.145E-03	0.173E-04	-0.9		40
67000	228.4	5.8	-1.2		0.834E 01	0.988E 00	-3.1		0.127E-03	0.155E-04	-1.7		40
68000	226.0	6.6	-0.6		0.716E 01	0.836E 00	-3.7		0.110E-03	0.138E-04	-3.0		39
69000	223.8	7.5	0.1		0.617E 01	0.715E 00	-3.8		0.962E-04	0.122E-04	-3.7		39
70000	221.2	8.6	0.6		0.529E 01	0.614E 00	-4.0		0.836E-04	0.108E-04	-4.4		38
71000	218.9	9.8	1.4		0.454E 01	0.523E 00	-3.9		0.725E-04	0.929E-05	-5.0		38
72000	216.7	11.3	2.2		0.389E 01	0.446E 00	-3.7		0.628E-04	0.797E-05	-5.6		38
73000	213.9	12.2	2.8		0.333E 01	0.381E 00	-3.4		0.544E-04	0.683E-05	-5.8		38
74000	210.5	12.2	3.1		0.284E 01	0.327E 00	-3.0		0.472E-04	0.598E-05	-5.6		38
75000	207.4	11.8	3.6		0.242E 01	0.269E 00	-2.6		0.408E-04	0.526E-05	-5.7		36
76000	204.6	12.2	4.3		0.205E 01	0.226E 00	-2.1		0.352E-04	0.471E-05	-5.7		36
77000	202.0	13.2	5.0		0.174E 01	0.188E 00	-1.5		0.302E-04	0.410E-05	-5.7		36
78000	199.8	13.1	6.0		0.147E 01	0.155E 00	-0.7		0.256E-04	0.354E-05	-5.8		36
79000	198.7	12.7	7.7		0.125E 01	0.120E 00	0.9		0.221E-04	0.288E-05	-5.6		35
80000	196.4	13.5	9.8		0.106E 01	0.999E-01	2.3		0.187E-04	0.219E-05	-6.3		35
81000	193.0	17.5	10.1		0.899E 00	0.854E-01	4.2		0.158E-04	0.189E-05	-4.7		34
82000	196.7	15.5	8.8		0.749E 00	0.619E-01	4.5		0.133E-04	0.154E-05	-3.3		32
83000	195.9	14.7	8.4		0.631E 00	0.517E-01	5.9		0.112E-04	0.123E-05	-1.7		32

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
84000	194.5	14.3	7.6	0.531E 00	0.441E-01	7.2	0.957E-05	0.100E-05	0.1
85000	193.3	14.7	6.9	0.447E 00	0.383E-01	8.4	0.810E-05	0.825E-06	32
86000	194.1	14.9	7.4	0.376E 00	0.377E-01	9.7	0.678E-05	0.684E-05	32
87000	195.9	15.5	8.4	0.315E 00	0.286E-01	10.4	0.562E-05	0.627E-06	31
88000	197.7	17.1	9.4	0.266E 00	0.260E-01	12.3	0.472E-05	0.529E-06	28
89000	196.7	21.2	8.8	0.228E 00	0.240E-01	16.5	0.403E-05	0.478E-06	25
90000	198.6	28.1	9.9	0.192E 00	0.121E-01	17.3	0.342E-05	0.467E-06	21
91000	197.5	16.4	7.6	0.166E 00	0.205E-01	21.3	0.294E-05	0.400E-06	19
92000	196.9	17.0	5.5	0.142E 00	0.173E-01	24.4	0.253E-05	0.377E-06	13
93000	194.0	5.0	2.3	0.123E 00	0.579E-02	28.9	0.222E-05	0.149E-06	10
94000	191.7	5.4	0.4	0.101E 00	0.285E-02	28.3	0.185E-05	0.102E-06	5
95000	195.0	8.8	-0.2	0.872E-01	0.184E-02	28.2	0.156E-05	0.104E-06	3
96000	199.3	4.8	0.4	0.736E-01	0.105E-02	28.1	0.128E-05	0.493E-07	2
97000	196.7	2.1	-2.3	0.624E-01	0.699E-03	28.1	0.110E-05	0.244E-07	2
98000	193.6	0.5	-5.2	0.526E-01	0.499E-03	27.1	0.946E-06	0.606E-08	2
99000	196.3	10.6	-5.2	0.443E-01	0.649E-03	25.8	0.788E-06	0.312E-07	2
100000	191.9	14.4	-8.5	0.373E-01	0.999E-03	24.0	0.679E-06	0.339E-07	2
101000	185.9	15.4	-13.4	0.313E-01	0.124E-02	21.7	0.589E-06	0.254E-07	2
102000	185.3	12.4	-15.6	0.261E-01	0.140E-02	17.9	0.491E-06	0.681E-08	2
103000	199.8	12.8	-10.9	0.220E-01	0.134E-02	15.3	0.383E-06	0.254E-09	2
104000	215.5	2.8	-5.9	0.187E-01	0.134E-02	13.6	0.302E-06	0.178E-07	2
105000	222.9	3.9	-4.7	0.161E-01	0.114E-02	12.7	0.252E-06	0.225E-07	2
106000	223.1	4.6	-6.4	0.139E-01	0.950E-03	11.9	0.216E-06	0.194E-07	2
107000	220.8	2.9	-9.2	0.120E-01	0.800E-03	10.2	0.189E-06	0.151E-07	2
108000	219.9	0.9	-11.2	0.103E-01	0.664E-03	8.5	0.163E-06	0.982E-08	2
109000	216.1	0.0	-14.3	0.890E-02	0.590E-03	6.4	0.143E-06	0.957E-08	2
110000	212.6	0.2	-17.2	0.763E-02	0.499E-03	3.7	0.125E-06	0.801E-08	2
111000	219.6	1.0	-17.5	0.654E-02	0.429E-03	0.6	0.103E-06	0.632E-08	2
112000	248.4	4.7	-9.9	0.566E-02	0.365E-03	-1.6	0.795E-07	0.665E-08	2
113000	295.2	8.6	3.5	0.501E-02	0.315E-03	-2.3	0.593E-07	0.546E-08	2
114000	339.5	14.7	15.2	0.452E-02	0.259E-03	-1.5	0.465E-07	0.469E-08	2
115000	378.1	19.6	24.4	0.412E-02	0.220E-03	-0.0	0.381E-07	0.401E-08	2
116000	403.1	24.1	28.7	0.379E-02	0.179E-03	2.0	0.329E-07	0.352E-08	2
117000	419.1	27.0	30.0	0.349E-02	0.154E-03	4.1	0.292E-07	0.318E-08	2
118000	431.9	37.9	30.3	0.322E-02	0.124E-03	5.9	0.262E-07	0.301E-08	2
119000	441.0	37.7	29.5	0.299E-02	0.950E-04	8.2	0.238E-07	0.279E-08	2
120000	445.4	43.7	27.4	0.277E-02	0.749E-04	10.0	0.219E-07	0.274E-08	2

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

SEASONAL MEAN PROFILE  
WALLOPS SPRING/FALL

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
25000	-18.9	0.0	18.9	93.0	1	0.0	0.0	0.0	1
30000	14.5	10.7	3.3	286.2	12	0.5	0.0	0.6	10
35000	14.5	17.7	6.3	292.4	18	0.7	0.2	1.0	16
40000	24.0	23.8	8.6	276.2	38	0.8	0.3	1.3	29
45000	28.3	31.3	11.4	272.7	45	1.2	0.2	1.8	37
50000	28.2	31.6	12.7	270.8	40	1.5	0.2	1.9	30
55000	23.5	33.0	21.4	261.2	46	1.6	0.5	1.6	38
60000	19.0	36.6	16.4	287.6	43	7.3	14.1	1.8	32
65000	18.2	38.4	19.2	251.9	42	4.2	73.1	2.3	33
70000	21.0	36.8	21.1	265.8	40	2.2	49.8	2.7	32
75000	1.8	42.1	2.0	245.6	42	2.8	0.9	1.7	32
80000	15.6	34.9	15.7	263.6	42	4.7	7.1	2.9	35
85000	1.7	45.5	10.5	350.6	44	6.1	2.0	4.8	38
90000	0.3	56.0	5.3	356.5	22	55.2	76.8	8.8	20

Table A.3(a).

## SEASONAL MEAN PROFILE

CHURCHILL WINTER

ALTITUDE M MSL	**TEMPERATURE** DEG K				*****PRESSURE***** NT/SQ M				*****DENSITY***** KG/CU M				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
26000	203.3	3.0	-8.6		0.180E 04	0.350E 02	-17.5		0.309E-01	0.106E-02	-9.6		2
27000	203.7	4.0	-8.8		0.152E 04	0.169E 02	-19.7		0.261E-01	0.806E-03	-10.8		3
28000	206.5	4.3	-7.9		0.129E 04	0.129E 02	-19.7		0.218E-01	0.645E-03	-12.6		4
29000	209.1	3.2	-7.2		0.110E 04	0.829E 01	-20.6		0.189E-01	0.398E-03	-14.4		4
30000	211.3	1.9	-6.6		0.937E 03	0.317E 01	-21.6		0.159E-01	0.205E-03	-16.0		4
31000	212.4	2.0	-6.6		0.799E 03	0.424E 01	-22.5		0.131E-01	0.189E-03	-17.0		4
32000	213.8	2.5	-6.3		0.682E 03	0.223E 01	-23.2		0.111E-01	0.153E-03	-18.0		4
33000	215.3	2.2	-6.7		0.582E 03	0.199E 01	-24.1		0.941E-02	0.101E-03	-18.6		4
34000	214.7	3.5	-8.1		0.516E 03	0.268E 02	-22.0		0.838E-02	0.489E-03	-15.1		8
35000	217.8	7.2	-7.9		0.454E 03	0.318E 02	-20.8		0.727E-02	0.452E-03	-14.0		13
36000	218.3	9.9	-8.7		0.395E 03	0.304E 02	-20.6		0.631E-02	0.485E-03	-12.9		17
37000	221.1	9.7	-8.6		0.339E 03	0.257E 02	-21.5		0.535E-02	0.384E-03	-14.0		19
38000	223.8	10.2	-8.5		0.292E 03	0.230E 02	-22.5		0.454E-02	0.329E-03	-15.2		19
39000	226.6	10.7	-8.4		0.251E 03	0.206E 02	-23.5		0.386E-02	0.283E-03	-16.4		19
40000	229.4	10.6	-8.3		0.216E 03	0.183E 02	-24.4		0.329E-02	0.238E-03	-17.5		20
41000	232.8	11.3	-7.9		0.192E 03	0.205E 02	-24.0		0.285E-02	0.243E-03	-17.4		22
42000	235.1	11.9	-8.0		0.166E 03	0.193E 02	-24.2		0.248E-02	0.225E-03	-17.6		26
43000	237.9	11.8	-7.9		0.144E 03	0.168E 02	-25.0		0.211E-02	0.200E-03	-18.5		28
44000	241.0	12.4	-7.7		0.125E 03	0.151E 02	-25.8		0.181E-02	0.184E-03	-19.6		28
45000	244.0	13.3	-7.6		0.109E 03	0.136E 02	-26.6		0.156E-02	0.168E-03	-20.5		28
46000	246.9	14.3	-7.4		0.933E 02	0.121E 02	-27.3		0.134E-02	0.154E-03	-21.4		28
47000	249.0	14.7	-7.6		0.832E 02	0.108E 02	-28.2		0.116E-02	0.139E-03	-22.2		28
48000	249.8	14.2	-7.7		0.726E 02	0.875E 01	-28.9		0.101E-02	0.123E-03	-23.0		28
49000	249.9	13.5	-7.6		0.634E 02	0.874E 01	-29.7		0.884E-03	0.109E-03	-23.9		28
50000	250.1	12.9	-7.6		0.554E 02	0.781E 01	-30.4		0.772E-03	0.971E-04	-24.7		28
51000	250.4	12.0	-7.4		0.488E 02	0.717E 01	-30.6		0.679E-03	0.834E-04	-25.0		29
52000	251.3	12.2	-7.1		0.427E 02	0.635E 01	-31.3		0.594E-03	0.847E-04	-26.0		29
53000	251.9	13.4	-6.5		0.373E 02	0.562E 01	-31.9		0.517E-03	0.769E-04	-27.1		29
54000	252.2	13.5	-5.7		0.326E 02	0.497E 01	-32.5		0.454E-03	0.696E-04	-28.3		29
55000	251.5	16.3	-5.2		0.285E 02	0.439E 01	-33.1		0.396E-03	0.616E-04	-29.2		29
56000	250.3	14.9	-5.0		0.249E 02	0.388E 01	-33.6		0.348E-03	0.538E-04	-30.0		29
57000	249.1	13.6	-4.7		0.218E 02	0.342E 01	-34.1		0.305E-03	0.476E-04	-30.7		29
58000	248.0	12.6	-4.4		0.190E 02	0.300E 01	-34.5		0.268E-03	0.426E-04	-31.3		29
59000	246.8	12.1	-4.2		0.166E 02	0.263E 01	-34.9		0.235E-03	0.385E-04	-31.9		29
60000	245.4	12.3	-4.0		0.145E 02	0.228E 01	-35.3		0.206E-03	0.348E-04	-32.4		29
61000	244.3	13.0	-3.7		0.126E 02	0.198E 01	-35.7		0.181E-03	0.314E-04	-32.9		29
62000	242.7	13.6	-3.2		0.110E 02	0.171E 01	-36.1		0.158E-03	0.281E-04	-33.5		29
63000	240.5	13.3	-2.6		0.957E 01	0.147E 01	-36.4		0.139E-03	0.242E-04	-34.4		29
64000	237.8	13.0	-2.1		0.831E 01	0.126E 01	-36.7		0.122E-03	0.209E-04	-35.0		29
65000	235.4	12.9	-1.6		0.722E 01	0.109E 01	-36.9		0.107E-03	0.180E-04	-35.6		29
66000	234.0	11.5	-0.5		0.625E 01	0.937E 00	-37.0		0.934E-04	0.154E-04	-36.4		29
67000	233.4	11.1	0.8		0.541E 01	0.803E 00	-37.0		0.811E-04	0.134E-04	-37.3		29
68000	233.1	11.3	2.4		0.469E 01	0.687E 00	-36.9		0.703E-04	0.118E-04	-38.2		29
69000	232.5	12.0	3.9		0.405E 01	0.585E 00	-36.7		0.611E-04	0.103E-04	-38.8		29
70000	232.5	12.6	5.8		0.351E 01	0.496E 00	-36.3		0.529E-04	0.900E-05	-39.5		29
71000	232.3	13.9	7.6		0.303E 01	0.421E 00	-35.8		0.458E-04	0.777E-05	-40.0		29
72000	231.9	15.2	9.4		0.252E 01	0.357E 00	-35.0		0.397E-04	0.678E-05	-40.3		29
73000	231.4	16.8	11.2		0.227E 01	0.300E 00	-34.2		0.344E-04	0.596E-05	-40.4		29
74000	229.9	17.0	12.6		0.196E 01	0.251E 00	-33.2		0.299E-04	0.516E-05	-40.2		29
75000	227.6	17.1	13.7		0.169E 01	0.210E 00	-32.0		0.261E-04	0.446E-05	-39.7		29
76000	224.9	17.3	14.6		0.145E 01	0.175E 00	-30.7		0.227E-04	0.380E-05	-39.0		29
77000	223.6	17.7	16.3		0.125E 01	0.148E 00	-29.1		0.197E-04	0.325E-05	-38.5		29
78000	221.4	18.8	17.5		0.107E 01	0.126E 00	-27.4		0.171E-04	0.276E-05	-37.6		28
79000	218.5	18.6	18.4		0.926E 00	0.106E 00	-25.5		0.148E-04	0.224E-05	-36.5		28
80000	216.2	20.3	19.6		0.794E 00	0.909E-01	-23.3		0.129E-04	0.187E-05	-35.3		28

ALTITUDE M MSL	WEST COMPONENT M/SEC	SOUTH COMPONENT M/SEC	SPEED M/SEC	DIRECTION DEGREES	NO OBS	WEST ERROR M/SEC	SOUTH ERROR M/SEC	TEMP ERROR DEGREES	NO OBS
MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV
81000	216.2	20.5	19.6	0.792E-01	-20.7	0.110E-04	0.159E-05	-33.2	27
82000	216.4	18.7	15.7	0.584E 00	-18.4	0.947E-05	0.132E-05	-31.4	27
83000	216.4	20.5	15.8	0.589E-01	-16.0	0.812E-05	0.120E-05	-29.3	27
84000	213.9	17.5	18.4	0.430E 00	-13.2	0.705E-05	0.101E-05	-26.2	26
85000	212.1	12.9	17.3	0.367E 00	-10.8	0.606E-05	0.821E-06	-23.8	26
86000	209.7	12.4	16.0	0.313E 00	-8.5	0.523E-05	0.744E-06	-20.9	26
87000	207.6	15.9	14.8	0.267E 00	-6.2	0.452E-05	0.701E-06	-17.7	25
88000	209.2	16.9	15.7	0.226E 00	-4.5	0.380E-05	0.571E-06	-16.9	23
89000	208.0	20.5	15.1	0.194E 00	-1.7	0.328E-05	0.498E-06	-13.7	21
90000	212.2	24.3	17.4	0.142E-01	-0.6	0.270E-05	0.347E-06	-14.5	19
91000	213.1	28.2	16.1	0.138E 00	1.0	0.228E-05	0.298E-06	-11.8	18
92000	212.9	15.1	14.0	0.117E 00	2.6	0.192E-05	0.176E-06	-9.7	17
93000	211.3	9.7	11.4	0.100E 00	4.4	0.165E-05	0.147E-06	-6.1	15
94000	207.1	10.0	7.5	0.855E-01	5.9	0.144E-05	0.142E-06	-1.1	11
95000	202.1	13.2	3.3	0.701E-01	3.1	0.121E-05	0.124E-06	0.3	8
96000	196.0	15.8	-1.2	0.594E-01	3.5	0.106E-05	0.121E-06	5.6	8
97000	200.2	8.7	-0.5	0.510E-01	4.7	0.888E-06	0.862E-07	5.5	5
98000	199.1	6.2	-2.5	0.430E-01	3.9	0.733E-06	0.643E-07	6.9	4
99000	197.8	4.9	-4.5	0.363E-01	3.2	0.640E-06	0.486E-07	8.3	4
100000	196.6	8.4	-6.3	0.307E-01	2.3	0.546E-06	0.460E-07	9.8	4
101000	195.4	12.3	-9.0	0.259E-01	0.7	0.464E-06	0.452E-07	11.6	4
102000	205.7	13.4	-6.3	0.219E-01	-0.7	0.374E-06	0.472E-07	7.1	4
103000	212.6	17.9	-5.2	0.187E-01	-1.6	0.310E-06	0.451E-07	5.5	4
104000	209.8	16.5	-8.4	0.159E-01	-3.1	0.267E-06	0.332E-07	7.4	4
105000	210.6	14.8	-9.9	0.136E-01	-4.8	0.226E-06	0.421E-07	7.1	4
106000	210.4	12.6	-11.7	0.116E-01	-6.7	0.193E-06	0.140E-07	7.0	4
107000	215.9	13.7	-11.2	0.996E-02	-8.3	0.161E-06	0.103E-07	4.5	4
108000	221.8	11.5	-10.5	0.856E-02	-10.0	0.134E-06	0.785E-08	1.8	4
109000	233.5	20.9	-7.4	0.739E-02	-11.4	0.111E-06	0.122E-07	-2.2	4
110000	242.5	39.3	-5.6	0.642E-02	-12.6	0.946E-07	0.152E-07	-3.6	4
111000	249.0	48.7	-6.5	0.559E-02	-13.8	0.808E-07	0.136E-07	-3.2	4
112000	262.2	50.7	-4.9	0.490E-02	-14.9	0.668E-07	0.178E-08	-6.5	4
113000	277.4	51.8	-2.7	0.432E-02	-15.8	0.554E-07	0.625E-08	-9.9	4
114000	294.7	48.3	0.0	0.384E-02	-16.3	0.459E-07	0.379E-08	-13.5	4
115000	315.7	42.7	3.9	0.344E-02	-16.4	0.382E-07	0.289E-08	-17.3	4
116000	333.5	42.9	6.5	0.310E-02	-16.2	0.326E-07	0.288E-08	-19.0	4
117000	347.5	48.2	7.8	0.282E-02	-15.8	0.284E-07	0.293E-08	-19.4	4
118000	359.8	55.4	8.6	0.256E-02	-15.5	0.250E-07	0.274E-08	-19.3	4
119000	374.2	63.7	9.9	0.234E-02	-15.2	0.220E-07	0.263E-08	-19.7	4
120000	388.4	69.4	11.1	0.215E-02	-14.5	0.195E-07	0.247E-08	-19.7	4

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

## CHURCHILL WINTER

Table A.3(b).

## SEASONAL MEAN PROFILE

CHURCHILL SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/SQ M	MEAN	ST DEV	PCT DIF	KG/CU M	
25000	230.1	0.0	3.8	0.0	0.275E 04	0.000E 00	7.8	0.400E 00	0.416E-01	0.000E 00	3.8	0.000E 00	1
26000	230.2	0.0	3.4	0.0	0.237E 04	0.000E 00	8.3	0.400E 00	0.398E-01	0.000E 00	4.6	0.000E 00	1
27000	230.2	0.0	2.9	0.0	0.204E 04	0.000E 00	8.5	0.400E 00	0.308E-01	0.000E 00	5.3	0.000E 00	1
28000	229.1	0.0	2.0	0.0	0.176E 04	0.000E 00	8.9	0.400E 00	0.267E-01	0.000E 00	6.7	0.000E 00	1
29000	229.4	0.0	1.7	0.0	0.152E 04	0.000E 00	9.3	0.400E 00	0.230E-01	0.000E 00	7.4	0.000E 00	1
30000	229.7	0.0	1.4	0.0	0.131E 04	0.000E 00	9.4	0.400E 00	0.198E-01	0.000E 00	7.9	0.000E 00	1
31000	229.2	0.0	0.7	0.0	0.113E 04	0.000E 00	9.6	0.400E 00	0.171E-01	0.000E 00	8.7	0.000E 00	1
32000	229.9	0.0	0.6	0.0	0.977E 03	0.000E 00	9.8	0.400E 00	0.148E-01	0.000E 00	9.1	0.000E 00	1
33000	231.4	0.0	0.1	0.0	0.844E 03	0.000E 00	9.9	0.400E 00	0.127E-01	0.000E 00	9.8	0.000E 00	1
34000	233.0	0.0	-0.2	0.0	0.729E 03	0.000E 00	9.8	0.400E 00	0.108E-01	0.000E 00	10.2	0.000E 00	1
35000	242.6	5.3	2.6	0.0	0.657E 03	0.210E 02	14.4	0.400E 00	0.944E-02	0.152E-03	11.5	0.152E-03	3
36000	246.1	4.4	2.8	0.0	0.569E 03	0.178E 02	14.2	0.400E 00	0.806E-02	0.152E-03	11.0	0.152E-03	4
37000	249.8	3.8	3.1	0.0	0.497E 03	0.163E 02	14.7	0.400E 00	0.693E-02	0.151E-03	11.1	0.151E-03	4
38000	253.1	3.8	3.4	0.0	0.434E 03	0.148E 02	15.2	0.400E 00	0.598E-02	0.143E-03	11.4	0.143E-03	4
39000	255.8	7.8	3.3	0.0	0.379E 03	0.107E 02	15.5	0.400E 00	0.517E-02	0.159E-03	11.8	0.159E-03	7
40000	258.6	6.9	3.2	0.0	0.332E 03	0.954E 01	15.7	0.400E 00	0.447E-02	0.109E-03	12.0	0.109E-03	8
41000	261.4	5.8	3.5	0.0	0.294E 03	0.869E 01	17.1	0.400E 00	0.391E-02	0.100E-03	13.3	0.100E-03	11
42000	263.8	5.6	3.0	0.0	0.258E 03	0.810E 01	17.4	0.400E 00	0.341E-02	0.924E-04	13.9	0.924E-04	11
43000	266.0	5.6	2.8	0.0	0.227E 03	0.725E 01	17.9	0.400E 00	0.298E-02	0.853E-04	14.7	0.853E-04	11
44000	267.8	5.9	2.4	0.0	0.200E 03	0.683E 01	18.2	0.400E 00	0.260E-02	0.793E-04	15.4	0.793E-04	11
45000	269.8	5.6	2.1	0.0	0.176E 03	0.616E 01	18.6	0.400E 00	0.228E-02	0.704E-04	16.1	0.704E-04	11
46000	271.2	4.9	1.6	0.0	0.156E 03	0.550E 01	18.9	0.400E 00	0.200E-02	0.643E-04	17.0	0.643E-04	11
47000	272.1	4.7	0.9	0.0	0.137E 03	0.496E 01	19.0	0.400E 00	0.176E-02	0.577E-04	17.9	0.577E-04	11
48000	272.7	4.9	0.7	0.0	0.121E 03	0.449E 01	19.1	0.400E 00	0.155E-02	0.505E-04	18.1	0.505E-04	12
49000	272.7	4.7	0.7	0.0	0.107E 03	0.398E 01	19.2	0.400E 00	0.137E-02	0.454E-04	18.2	0.454E-04	12
50000	272.2	4.5	0.5	0.0	0.951E 02	0.360E 01	19.2	0.400E 00	0.121E-02	0.396E-04	18.5	0.396E-04	12
51000	271.4	4.5	0.2	0.0	0.840E 02	0.328E 01	19.2	0.400E 00	0.107E-02	0.345E-04	18.9	0.345E-04	12
52000	270.4	4.4	-0.0	0.0	0.742E 02	0.301E 01	19.2	0.400E 00	0.955E-03	0.294E-04	19.3	0.294E-04	12
53000	269.3	4.5	-0.0	0.0	0.655E 02	0.274E 01	19.2	0.400E 00	0.847E-03	0.258E-04	19.2	0.258E-04	12
54000	268.1	4.6	0.2	0.0	0.578E 02	0.251E 01	19.2	0.400E 00	0.750E-03	0.235E-04	18.8	0.235E-04	12
55000	267.0	4.3	0.5	0.0	0.509E 02	0.229E 01	19.2	0.400E 00	0.664E-03	0.225E-04	18.5	0.225E-04	12
56000	265.9	4.3	0.8	0.0	0.449E 02	0.208E 01	19.3	0.400E 00	0.588E-03	0.219E-04	18.2	0.219E-04	12
57000	264.4	4.6	1.0	0.0	0.395E 02	0.187E 01	19.4	0.400E 00	0.521E-03	0.212E-04	18.1	0.212E-04	12
58000	262.4	5.6	1.0	0.0	0.348E 02	0.170E 01	19.5	0.400E 00	0.462E-03	0.197E-04	18.3	0.197E-04	12
59000	259.8	6.1	0.8	0.0	0.306E 02	0.153E 01	19.7	0.400E 00	0.410E-03	0.181E-04	18.7	0.181E-04	12
60000	256.3	6.5	0.2	0.0	0.268E 02	0.138E 01	19.7	0.400E 00	0.365E-03	0.175E-04	19.4	0.175E-04	12
61000	252.7	7.2	-0.3	0.0	0.235E 02	0.123E 01	19.7	0.400E 00	0.324E-03	0.167E-04	20.2	0.167E-04	12
62000	248.9	7.8	-0.8	0.0	0.206E 02	0.109E 01	19.5	0.400E 00	0.288E-03	0.150E-04	20.6	0.150E-04	12
63000	245.3	7.3	-0.7	0.0	0.179E 02	0.995E 00	19.3	0.400E 00	0.255E-03	0.134E-04	20.2	0.134E-04	12
64000	241.9	6.8	-0.5	0.0	0.156E 02	0.881E 00	19.2	0.400E 00	0.225E-03	0.119E-04	19.8	0.119E-04	12
65000	238.4	6.5	-0.3	0.0	0.136E 02	0.789E 00	19.1	0.400E 00	0.199E-03	0.104E-04	19.5	0.104E-04	12
66000	234.7	6.0	-0.2	0.0	0.118E 02	0.710E 00	19.0	0.400E 00	0.175E-03	0.935E-05	19.3	0.935E-05	12
67000	230.3	5.2	-0.4	0.0	0.102E 02	0.626E 00	18.9	0.400E 00	0.154E-03	0.843E-05	19.5	0.843E-05	12
68000	225.7	4.5	-0.7	0.0	0.884E 01	0.552E 00	18.8	0.400E 00	0.135E-03	0.779E-05	19.7	0.779E-05	12
69000	220.9	3.8	-1.1	0.0	0.761E 01	0.485E 00	18.5	0.400E 00	0.120E-03	0.724E-05	20.0	0.724E-05	12
70000	215.4	3.4	-1.9	0.0	0.652E 01	0.421E 00	18.2	0.400E 00	0.105E-03	0.642E-05	20.5	0.642E-05	12
71000	209.8	3.6	-2.7	0.0	0.557E 01	0.363E 00	17.8	0.400E 00	0.925E-04	0.573E-05	21.1	0.573E-05	12
72000	204.3	4.2	-3.5	0.0	0.474E 01	0.315E 00	17.1	0.400E 00	0.808E-04	0.495E-05	21.4	0.495E-05	12
73000	199.4	4.8	-4.1	0.0	0.402E 01	0.272E 00	16.4	0.400E 00	0.702E-04	0.435E-05	21.3	0.435E-05	12
74000	194.5	5.6	-4.6	0.0	0.339E 01	0.236E 00	15.4	0.400E 00	0.607E-04	0.386E-05	21.1	0.386E-05	12
75000	189.1	6.5	-5.5	0.0	0.284E 01	0.205E 00	14.4	0.400E 00	0.524E-04	0.354E-05	21.0	0.354E-05	12
76000	183.7	7.6	-6.3	0.0	0.238E 01	0.176E 00	13.1	0.400E 00	0.451E-04	0.326E-05	20.9	0.326E-05	12
77000	178.0	8.6	-7.4	0.0	0.197E 01	0.153E 00	11.5	0.400E 00	0.387E-04	0.292E-05	20.7	0.292E-05	12
78000	173.8	7.7	-7.7	0.0	0.163E 01	0.132E 00	10.0	0.400E 00	0.328E-04	0.245E-05	19.3	0.245E-05	12
79000	171.5	7.6	-7.0	0.0	0.134E 01	0.113E 00	8.4	0.400E 00	0.274E-04	0.219E-05	16.7	0.219E-05	12

80000	169.9	8.5	-5.9	0.110E 01	0.964E-01	6.9	0.227E-04	0.195E-05	13.8	12
81000	168.6	9.1	-6.6	0.910E 00	0.817E-01	5.6	0.188E-04	0.170E-05	13.3	12
82000	167.4	9.5	-7.3	0.746E 00	0.693E-01	4.1	0.155E-04	0.146E-05	12.5	12
83000	164.7	9.3	-8.8	0.610E 00	0.588E-01	2.4	0.129E-04	0.120E-05	12.3	12
84000	161.2	9.5	-10.7	0.497E 00	0.502E-01	0.3	0.107E-04	0.100E-05	12.4	12
85000	157.7	9.8	-12.7	0.403E 00	0.431E-01	-2.1	0.892E-05	0.856E-06	12.1	12
86000	153.8	9.0	-14.8	0.325E 00	0.369E-01	-5.0	0.737E-05	0.697E-06	11.5	12
87000	152.1	7.0	-15.8	0.264E 00	0.317E-01	-7.3	0.605E-05	0.625E-06	9.9	11
88000	149.4	6.4	-17.3	0.206E 00	0.218E-01	-12.8	0.483E-05	0.547E-06	5.5	10
89000	150.7	9.1	-16.5	0.166E 00	0.158E-01	-15.8	0.387E-05	0.571E-06	1.6	8
90000	157.9	15.9	-12.6	0.130E 00	0.886E-02	-20.4	0.292E-05	0.436E-06	-7.7	7
91000	160.9	12.1	-12.3	0.106E 00	0.757E-02	-22.4	0.231E-05	0.233E-06	-11.0	6
92000	164.8	7.6	-11.6	0.869E-01	0.700E-02	-24.0	0.183E-05	0.136E-06	-13.9	5
93000	167.4	0.8	-11.6	0.660E-01	0.528E-02	-31.1	0.137E-05	0.103E-06	-22.0	2
94000	172.9	0.9	-10.2	0.543E-01	0.443E-02	-32.6	0.109E-05	0.834E-07	-25.0	2
95000	180.3	0.0	-7.7	0.413E-01	0.400E 00	-39.2	0.797E-06	0.000E 00	-34.1	1
96000	190.9	0.0	-3.8	0.345E-01	0.400E 00	-39.9	0.629E-06	0.000E 00	-37.5	1
97000	199.8	0.0	-0.7	0.291E-01	0.400E 00	-40.2	0.507E-06	0.000E 00	-39.7	1
98000	204.7	0.0	0.1	0.248E-01	0.400E 00	-40.0	0.422E-06	0.000E 00	-40.0	1
99000	208.5	0.0	0.6	0.211E-01	0.400E 00	-40.1	0.352E-06	0.000E 00	-40.3	1
100000	210.2	0.0	0.0	0.180E-01	0.400E 00	-40.1	0.298E-06	0.000E 00	-40.0	1
101000	212.6	0.0	-1.0	0.153E-01	0.400E 00	-40.5	0.250E-06	0.000E 00	-39.7	1
102000	213.2	0.0	-2.9	0.132E-01	0.400E 00	-40.3	0.215E-06	0.000E 00	-38.2	1
103000	214.7	0.0	-4.3	0.113E-01	0.400E 00	-40.7	0.183E-06	0.000E 00	-37.7	1
104000	217.5	0.0	-5.1	0.968E-02	0.400E 00	-41.3	0.155E-06	0.000E 00	-37.7	1
105000	219.5	0.0	-6.1	0.832E-02	0.400E 00	-41.8	0.132E-06	0.000E 00	-37.6	1
106000	222.7	0.0	-6.6	0.716E-02	0.400E 00	-42.5	0.112E-06	0.000E 00	-37.9	1
107000	225.4	0.0	-7.3	0.619E-02	0.400E 00	-43.1	0.956E-07	0.000E 00	-37.9	1
108000	229.8	0.0	-7.3	0.535E-02	0.400E 00	-43.8	0.811E-07	0.000E 00	-38.6	1
109000	233.9	0.0	-7.3	0.464E-02	0.400E 00	-44.4	0.691E-07	0.000E 00	-39.3	1
110000	240.0	0.0	-6.6	0.403E-02	0.400E 00	-45.1	0.584E-07	0.000E 00	-40.4	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

## CHURCHILL SUMMER

ALTITUDE M MSL	WEST COMPONENT M/SEC		SOUTH COMPONENT M/SEC		SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV		SOUTH ERROR M/SEC MEAN ST DEV		TEMP ERROR DEGREES MEAN ST DEV		NO OBS	TEMP ERROR DEGREES MEAN ST DEV
	MEAN	ST DEV	MEAN	ST DEV				MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV		
30000	-11.2	0.9	3.9	3.3	11.9	109.4	2	0.0	0.0	0.0	0.0	1.1	0.0	2	
35000	-17.6	13.0	0.0	7.9	17.6	90.0	5	0.0	0.0	0.0	0.0	1.5	1.4	5	
40000	-15.5	12.9	-0.6	7.7	15.5	87.7	14	0.0	0.0	0.0	0.0	2.3	1.3	14	
45000	-16.8	8.3	0.0	7.3	17.3	76.5	14	0.0	0.0	0.0	0.0	1.9	1.3	14	
50000	-23.4	10.0	-9.6	11.3	25.3	67.6	13	0.0	0.0	0.0	0.0	1.5	0.8	13	
55000	-32.6	15.6	-6.7	14.9	33.3	75.3	16	0.0	0.0	0.0	0.0	2.1	1.4	16	
60000	-24.4	15.2	-0.6	28.6	24.4	88.5	12	0.0	0.0	0.0	0.0	2.0	1.5	12	
65000	-41.3	19.0	4.9	20.1	41.5	98.7	14	0.0	0.0	0.0	0.0	1.4	1.4	14	
70000	-57.0	26.3	-3.6	17.3	57.1	85.3	17	0.0	0.0	0.0	0.0	1.8	1.5	17	
75000	-59.7	44.9	-19.2	62.1	62.7	72.1	13	0.0	0.0	0.0	0.0	1.9	2.0	13	
80000	-17.4	52.8	-15.0	46.1	23.0	45.2	17	0.0	0.0	0.0	0.0	1.5	2.0	17	
85000	20.7	61.5	7.4	46.0	22.0	250.3	19	0.0	0.0	0.0	0.0	1.7	1.5	19	
90000	51.6	60.9	-8.9	101.7	52.4	279.8	10	0.0	0.0	0.0	0.0	2.4	2.0	10	

Table A.3(c).

SEASONAL MEAN PROFILE  
CHURCHILL SPRNG/FALL

ALTITUDE M VSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/50 M	MEAN	ST DEV	PCT DIF	KG/CU M	
34000	228.0	0.0	-2.4	0.0	0.634E 03	0.000E 00	-4.3	0.000E 00	0.969E-02	0.000E 00	-1.9	0.000E 00	1
35000	231.0	11.1	-2.2	0.0	0.562E 03	0.283E 02	-2.1	0.847E-02	0.100E-03	0.100E-03	0.1	0.100E-03	3
36000	229.4	12.5	-4.1	0.0	0.476E 03	0.285E 02	-4.4	0.723E-02	0.135E-03	0.135E-03	0.3	0.135E-03	9
37000	233.3	11.6	-3.6	0.0	0.412E 03	0.266E 02	-4.7	0.615E-02	0.181E-03	0.181E-03	1.2	0.181E-03	9
38000	235.8	11.3	-3.6	0.0	0.355E 03	0.231E 02	-5.7	0.524E-02	0.201E-03	0.201E-03	-2.2	0.201E-03	11
39000	239.2	12.6	-3.3	0.0	0.308E 03	0.218E 02	-6.3	0.448E-02	0.221E-03	0.221E-03	-3.0	0.221E-03	11
40000	242.9	14.5	-2.9	0.0	0.267E 03	0.205E 02	-6.8	0.328E-02	0.226E-03	0.226E-03	-4.9	0.226E-03	11
41000	246.7	16.7	-2.5	0.0	0.232E 03	0.194E 02	-7.4	0.328E-02	0.226E-03	0.226E-03	-4.9	0.226E-03	11
42000	249.2	15.6	-2.6	0.0	0.205E 03	0.198E 02	-6.6	0.287E-02	0.205E-03	0.205E-03	-4.0	0.205E-03	12
43000	250.8	14.3	-2.9	0.0	0.177E 03	0.187E 02	-7.9	0.246E-02	0.186E-03	0.186E-03	-5.1	0.186E-03	13
44000	252.4	13.9	-3.4	0.0	0.155E 03	0.173E 02	-8.3	0.214E-02	0.158E-03	0.158E-03	-5.2	0.158E-03	13
45000	254.3	13.2	-3.7	0.0	0.136E 03	0.159E 02	-8.7	0.185E-02	0.141E-03	0.141E-03	-5.4	0.141E-03	13
46000	256.0	13.0	-4.0	0.0	0.119E 03	0.147E 02	-9.1	0.161E-02	0.130E-03	0.130E-03	-5.6	0.130E-03	13
47000	256.7	12.5	-4.7	0.0	0.104E 03	0.135E 02	-9.7	0.141E-02	0.121E-03	0.121E-03	-5.5	0.121E-03	13
48000	256.9	12.3	-5.0	0.0	0.917E 02	0.124E 02	-10.3	0.123E-02	0.114E-03	0.114E-03	-5.8	0.114E-03	13
49000	256.8	11.8	-5.1	0.0	0.805E 02	0.113E 02	-10.8	0.108E-02	0.109E-03	0.109E-03	-6.3	0.109E-03	13
50000	256.6	11.2	-5.1	0.0	0.705E 02	0.103E 02	-11.4	0.955E-03	0.104E-03	0.104E-03	-6.8	0.104E-03	13
51000	257.2	9.7	-4.9	0.0	0.620E 02	0.939E 01	-11.9	0.837E-03	0.992E-04	0.992E-04	-7.7	0.992E-04	13
52000	257.8	8.3	-4.7	0.0	0.544E 02	0.848E 01	-12.5	0.733E-03	0.931E-04	0.931E-04	-8.4	0.931E-04	13
53000	257.9	7.1	-4.2	0.0	0.477E 02	0.762E 01	-13.0	0.643E-03	0.869E-04	0.869E-04	-9.3	0.869E-04	13
54000	257.1	6.5	-3.9	0.0	0.419E 02	0.682E 01	-13.5	0.566E-03	0.805E-04	0.805E-04	-10.2	0.805E-04	13
55000	255.8	7.2	-3.6	0.0	0.367E 02	0.608E 01	-14.0	0.499E-03	0.741E-04	0.741E-04	-10.9	0.741E-04	13
56000	254.4	8.6	-3.4	0.0	0.322E 02	0.541E 01	-14.4	0.440E-03	0.677E-04	0.677E-04	-11.4	0.677E-04	13
57000	253.1	9.8	-3.2	0.0	0.282E 02	0.480E 01	-14.8	0.388E-03	0.616E-04	0.616E-04	-11.9	0.616E-04	13
58000	251.8	9.4	-3.0	0.0	0.247E 02	0.425E 01	-15.2	0.341E-03	0.554E-04	0.554E-04	-12.6	0.554E-04	13
59000	250.5	9.1	-2.7	0.0	0.216E 02	0.375E 01	-15.5	0.300E-03	0.496E-04	0.496E-04	-13.1	0.496E-04	13
60000	248.2	8.0	-2.9	0.0	0.188E 02	0.332E 01	-15.9	0.264E-03	0.433E-04	0.433E-04	-13.4	0.433E-04	13
61000	245.2	8.6	-3.3	0.0	0.164E 02	0.293E 01	-16.3	0.233E-03	0.380E-04	0.380E-04	-13.5	0.380E-04	13
62000	241.9	9.4	-3.6	0.0	0.143E 02	0.259E 01	-16.7	0.206E-03	0.336E-04	0.336E-04	-13.7	0.336E-04	13
63000	238.5	9.4	-3.4	0.0	0.125E 02	0.228E 01	-17.0	0.182E-03	0.303E-04	0.303E-04	-14.2	0.303E-04	13
64000	236.2	8.9	-2.8	0.0	0.108E 02	0.201E 01	-17.3	0.160E-03	0.275E-04	0.275E-04	-15.0	0.275E-04	13
65000	234.2	8.5	-2.1	0.0	0.941E 01	0.176E 01	-17.7	0.140E-03	0.251E-04	0.251E-04	-16.0	0.251E-04	13
66000	232.4	9.0	-1.2	0.0	0.815E 01	0.154E 01	-17.9	0.122E-03	0.227E-04	0.227E-04	-16.8	0.227E-04	13
67000	230.5	9.4	-0.3	0.0	0.705E 01	0.134E 01	-18.0	0.106E-03	0.201E-04	0.201E-04	-17.6	0.201E-04	13
68000	228.6	8.2	0.5	0.0	0.609E 01	0.116E 01	-18.1	0.929E-04	0.175E-04	0.175E-04	-18.5	0.175E-04	13
69000	226.9	7.5	1.4	0.0	0.526E 01	0.100E 01	-18.0	0.807E-04	0.153E-04	0.153E-04	-19.2	0.153E-04	13
70000	225.1	7.6	2.4	0.0	0.453E 01	0.870E 00	-17.7	0.702E-04	0.134E-04	0.134E-04	-19.7	0.134E-04	13
71000	223.5	8.0	3.5	0.0	0.391E 01	0.751E 00	-17.4	0.609E-04	0.118E-04	0.118E-04	-20.2	0.118E-04	13
72000	222.3	7.5	4.9	0.0	0.336E 01	0.646E 00	-16.9	0.527E-04	0.104E-04	0.104E-04	-20.7	0.104E-04	13
73000	220.7	7.0	6.1	0.0	0.289E 01	0.553E 00	-16.2	0.457E-04	0.919E-05	0.919E-05	-21.0	0.919E-05	13
74000	219.1	7.1	7.3	0.0	0.248E 01	0.471E 00	-15.5	0.395E-04	0.808E-05	0.808E-05	-21.1	0.808E-05	13
75000	217.5	7.3	8.6	0.0	0.212E 01	0.398E 00	-14.4	0.342E-04	0.714E-05	0.714E-05	-21.0	0.714E-05	13
76000	214.8	7.1	9.4	0.0	0.182E 01	0.334E 00	-13.4	0.296E-04	0.623E-05	0.623E-05	-20.5	0.623E-05	13
77000	211.5	8.5	10.0	0.0	0.155E 01	0.279E 00	-12.2	0.257E-04	0.544E-05	0.544E-05	-19.7	0.544E-05	13
78000	208.1	10.3	10.4	0.0	0.132E 01	0.231E 00	-10.9	0.223E-04	0.463E-05	0.463E-05	-18.8	0.463E-05	13
79000	204.5	11.5	10.8	0.0	0.112E 01	0.192E 00	-9.4	0.193E-04	0.384E-05	0.384E-05	-17.8	0.384E-05	13
80000	202.3	11.9	11.9	0.0	0.956E 00	0.159E 00	-7.7	0.165E-04	0.323E-05	0.323E-05	-17.1	0.323E-05	13
81000	201.2	11.7	11.3	0.0	0.810E 00	0.132E 00	-6.0	0.141E-04	0.270E-05	0.270E-05	-15.1	0.270E-05	13
82000	199.6	11.8	10.4	0.0	0.685E 00	0.109E 00	-4.4	0.120E-04	0.228E-05	0.228E-05	-12.9	0.228E-05	13
83000	199.0	12.5	10.1	0.0	0.578E 00	0.901E-01	-2.9	0.101E-04	0.195E-05	0.195E-05	-11.3	0.195E-05	13
84000	197.6	13.6	9.3	0.0	0.488E 00	0.738E-01	-1.4	0.867E-05	0.165E-05	0.165E-05	-9.2	0.165E-05	13
85000	198.1	15.0	9.6	0.0	0.422E 00	0.507E-01	2.3	0.751E-05	0.140E-05	0.140E-05	-5.5	0.140E-05	12
86000	196.1	17.5	8.5	0.0	0.355E 00	0.394E-01	3.6	0.640E-05	0.117E-05	0.117E-05	-3.1	0.117E-05	12
87000	194.3	18.5	7.5	0.0	0.299E 00	0.306E-01	4.8	0.544E-05	0.949E-06	0.949E-06	-1.1	0.949E-06	12
88000	193.0	18.7	6.8	0.0	0.251E 00	0.238E-01	5.8	0.459E-05	0.753E-06	0.753E-06	0.3	0.753E-06	12

89000 191.9 18.8 6.2 0.210E-00 0.190E-01 6.7 0.387E-05 0.593E-06 1.6 12  
 90000 193.0 22.6 6.8 0.175E-00 0.129E-01 8.7 0.321E-05 0.483E-06 1.3 9  
 91000 191.7 24.9 4.4 0.150E-00 0.834E-02 9.5 0.276E-05 0.354E-06 6.5 8  
 92000 186.8 21.4 0.1 0.124E-00 0.784E-02 8.6 0.234E-05 0.220E-06 9.5 7  
 93000 186.8 19.2 -1.4 0.102E-00 0.834E-02 7.2 0.192E-05 0.974E-07 9.2 6  
 94000 192.4 19.5 -0.0 0.873E-01 0.982E-02 8.3 0.154E-05 0.479E-07 8.3 4  
 95000 188.6 17.2 -3.4 0.703E-01 0.870E-02 3.4 0.129E-05 0.659E-07 6.9 3  
 96000 181.3 9.6 -8.6 0.560E-01 0.839E-02 -2.4 0.107E-05 0.104E-06 6.2 2

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

SEASONAL MEAN PROFILE  
 CHURCHILL SPRNG/FALL

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO	
	MEAN	ST DEV	MEAN	ST DEV	M/SEC	M/SEC	DEGREES	DEGREES	MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV	NO	OBS
30000	-1.0	3.4	-10.5	10.3	10.5	10.5	5.5	5.5	0.6	0.0	0.6	0.0	0.4	0.1	3	3
35000	14.4	11.5	-8.1	12.0	16.5	16.5	299.5	299.5	2.0	0.9	2.1	1.0	1.0	0.6	9	9
40000	17.5	18.7	-5.1	20.8	18.2	18.2	286.5	286.5	3.2	1.3	3.3	1.4	1.6	1.0	11	11
45000	29.5	23.3	-1.6	14.0	29.5	29.5	273.2	273.2	4.5	2.1	4.6	2.2	2.1	1.3	17	17
50000	30.4	30.4	-10.2	15.0	32.1	32.1	288.5	288.5	5.9	3.7	6.0	3.8	2.3	1.6	14	14
55000	28.5	31.4	-14.2	18.7	31.9	31.9	296.5	296.5	7.3	3.3	7.3	3.4	2.0	1.3	17	17
60000	25.8	33.7	-0.7	17.1	25.8	25.8	271.7	271.7	7.1	2.6	7.0	2.7	1.9	1.6	14	14
65000	20.0	29.5	1.6	20.6	20.0	20.0	265.2	265.2	9.9	1.2	9.8	1.2	1.9	1.4	13	13
70000	28.9	32.3	5.1	28.2	29.4	29.4	259.9	259.9	11.1	1.7	11.1	1.7	2.4	1.3	14	14
75000	12.3	39.7	8.6	43.9	15.0	15.0	234.8	234.8	10.5	1.8	11.1	1.8	2.5	2.1	16	16
80000	11.1	41.6	2.8	60.2	11.5	11.5	255.7	255.7	16.2	11.3	16.2	11.2	4.0	3.3	16	16
85000	-6.3	45.5	22.1	66.5	22.9	22.9	164.0	164.0	24.7	8.8	25.1	8.8	4.2	2.3	21	21
90000	32.4	44.0	10.0	116.3	33.9	33.9	252.7	252.7	31.0	10.5	34.6	14.6	9.6	15.7	16	16
95000	25.2	69.0	6.9	64.6	26.1	26.1	254.5	254.5	115.9	72.7	111.2	66.1	14.7	11.7	3	3

Table A.4(a).

## SEASONAL MEAN PROFILE

## BARROW WINTER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/SQ M				KG/CU M				
33000	241.8	0.6	4.7		0.736E 03	0.261E 02	-3.9		0.106E-01	0.348E-03	-8.3		2
34000	230.3	14.4	-1.4		0.599E 03	0.469E 02	-9.6		0.905E-02	0.292E-03	-8.3		5
35000	228.1	15.3	-3.5		0.434E 02	0.434E 02	-12.2		0.769E-02	0.282E-03	-9.0		9
36000	228.5	13.6	-4.5		0.437E 03	0.386E 02	-12.2		0.666E-02	0.301E-03	-8.2		15
37000	229.7	14.7	-5.1		0.380E 03	0.366E 02	-12.2		0.575E-02	0.278E-03	-7.6		16
38000	229.6	15.5	-6.1		0.328E 03	0.347E 02	-12.8		0.497E-02	0.267E-03	-7.3		16
39000	229.7	16.4	-7.1		0.283E 03	0.325E 02	-13.7		0.429E-02	0.253E-03	-7.2		16
40000	230.1	17.3	-8.0		0.245E 03	0.305E 02	-14.6		0.369E-02	0.245E-03	-7.4		16
41000	232.7	19.1	-8.0		0.214E 03	0.287E 02	-14.7		0.319E-02	0.230E-03	-7.6		17
42000	234.1	17.5	-8.5		0.188E 03	0.269E 02	-14.3		0.279E-02	0.252E-03	-6.7		19
43000	235.2	16.7	-9.0		0.163E 03	0.247E 02	-15.4		0.240E-02	0.243E-03	-7.3		19
44000	236.3	15.8	-9.5		0.141E 03	0.225E 02	-16.4		0.207E-02	0.234E-03	-7.9		19
45000	237.2	15.3	-10.2		0.123E 03	0.205E 02	-17.4		0.179E-02	0.222E-03	-8.4		19
46000	237.7	14.7	-10.9		0.106E 03	0.186E 02	-18.6		0.155E-02	0.206E-03	-9.1		19
47000	238.6	14.3	-11.5		0.928E 02	0.168E 02	-19.9		0.134E-02	0.190E-03	-9.8		19
48000	238.9	13.9	-11.7		0.806E 02	0.151E 02	-21.1		0.117E-02	0.175E-03	-11.0		19
49000	239.2	14.0	-11.6		0.701E 02	0.135E 02	-22.3		0.101E-02	0.161E-03	-12.5		19
50000	239.1	12.6	-11.6		0.609E 02	0.121E 02	-23.5		0.884E-03	0.145E-03	-13.9		19
51000	239.1	11.1	-11.6		0.530E 02	0.108E 02	-24.7		0.768E-03	0.132E-03	-15.2		19
52000	239.1	10.2	-11.6		0.461E 02	0.964E 01	-25.8		0.668E-03	0.121E-03	-16.5		19
53000	239.4	9.9	-11.1		0.400E 02	0.852E 01	-27.0		0.581E-03	0.110E-03	-18.1		19
54000	239.3	7.5	-10.5		0.348E 02	0.747E 01	-28.1		0.506E-03	0.103E-03	-19.7		19
55000	239.4	8.7	-9.8		0.303E 02	0.652E 01	-29.0		0.442E-03	0.967E-04	-21.1		19
56000	239.8	12.0	-9.0		0.263E 02	0.564E 01	-30.0		0.384E-03	0.899E-04	-22.6		19
57000	240.6	12.9	-8.0		0.228E 02	0.483E 01	-30.9		0.333E-03	0.799E-04	-24.3		19
58000	241.3	12.1	-7.0		0.198E 02	0.413E 01	-31.7		0.289E-03	0.684E-04	-25.9		19
59000	241.1	11.9	-6.4		0.172E 02	0.353E 01	-32.5		0.251E-03	0.588E-04	-27.2		18
60000	239.4	12.4	-6.3		0.148E 02	0.301E 01	-33.8		0.218E-03	0.517E-04	-28.7		18
61000	237.8	13.4	-5.2		0.128E 02	0.255E 01	-34.5		0.190E-03	0.448E-04	-29.4		18
62000	236.3	15.0	-5.8		0.111E 02	0.216E 01	-35.2		0.166E-03	0.386E-04	-30.4		18
63000	234.9	14.8	-4.9		0.947E 01	0.183E 01	-35.8		0.145E-03	0.339E-04	-31.7		18
64000	233.1	12.9	-4.1		0.838E 01	0.155E 01	-36.2		0.128E-03	0.277E-04	-32.9		18
65000	231.9	11.3	-3.0		0.725E 01	0.131E 01	-36.6		0.109E-03	0.233E-04	-34.1		18
66000	229.9	10.9	-2.3		0.626E 01	0.111E 01	-36.9		0.955E-04	0.198E-04	-35.0		18
67000	228.2	11.3	-1.3		0.540E 01	0.940E 00	-37.2		0.830E-04	0.168E-04	-35.8		18
68000	225.9	11.1	-0.6		0.466E 01	0.793E 00	-37.3		0.723E-04	0.143E-04	-36.5		18
69000	222.7	11.3	-0.3		0.401E 01	0.665E 00	-37.4		0.631E-04	0.124E-04	-36.8		18
70000	219.6	12.1	-0.0		0.344E 01	0.554E 00	-37.5		0.551E-04	0.110E-04	-37.0		18
71000	217.0	13.2	0.5		0.295E 01	0.459E 00	-37.6		0.478E-04	0.973E-05	-37.3		18
72000	215.0	14.4	1.4		0.252E 01	0.375E 00	-37.6		0.414E-04	0.848E-05	-37.8		18
73000	213.5	15.0	2.6		0.215E 01	0.302E 00	-37.5		0.356E-04	0.718E-05	-38.4		18
74000	212.4	14.5	4.0		0.184E 01	0.241E 00	-37.3		0.305E-04	0.586E-05	-39.0		18
75000	211.5	14.4	5.6		0.157E 01	0.192E 00	-36.9		0.261E-04	0.475E-05	-39.6		18
76000	211.4	15.4	7.7		0.134E 01	0.153E 00	-36.3		0.223E-04	0.388E-05	-40.2		18
77000	213.8	16.7	11.2		0.114E 01	0.121E 00	-35.4		0.188E-04	0.321E-05	-41.2		18
78000	217.4	18.9	15.4		0.979E 00	0.955E-01	-34.1		0.158E-04	0.266E-05	-42.2		18
79000	221.3	22.6	19.9		0.839E 00	0.754E-01	-32.5		0.133E-04	0.220E-05	-42.9		18
80000	221.8	22.0	22.7		0.714E 00	0.558E-01	-31.1		0.113E-04	0.178E-05	-43.0		17
81000	219.6	21.0	21.5		0.613E 00	0.446E-01	-28.8		0.984E-05	0.139E-05	-40.7		17
82000	218.7	20.8	21.0		0.525E 00	0.364E-01	-26.7		0.846E-05	0.109E-05	-38.7		17
83000	218.7	22.5	21.0		0.450E 00	0.304E-01	-24.4		0.726E-05	0.948E-06	-36.8		17
84000	221.6	21.9	22.6		0.386E 00	0.262E-01	-22.0		0.613E-05	0.731E-06	-35.8		17
85000	224.1	22.5	24.0		0.332E 00	0.224E-01	-19.4		0.521E-05	0.631E-06	-34.4		17
86000	223.7	21.1	23.8		0.286E 00	0.194E-01	-16.6		0.449E-05	0.518E-06	-32.0		17
87000	224.4	22.5	24.2		0.244E 00	0.171E-01	-13.7		0.385E-05	0.460E-06	-29.8		17

88000 224.1 18.5 24.0 0.213E 00 0.145E-01 -10.2 0.333E-05 0.345E-06 -27.1 16  
 89000 220.5 18.6 22.0 0.185E 00 0.107E-01 -6.3 0.294E-05 0.289E-06 -22.7 15  
 90000 216.7 20.1 18.8 0.158E 00 0.927E-02 -3.4 0.259E-05 0.254E-06 -18.1 15  
 91000 207.3 17.0 12.9 0.136E 00 0.847E-02 -0.3 0.230E-05 0.216E-06 -11.2 13  
 92000 206.0 22.1 10.4 0.116E 00 0.773E-02 1.4 0.198E-05 0.236E-06 -7.1 10  
 93000 201.9 17.5 6.5 0.983E-01 0.694E-02 2.4 0.170E-05 0.180E-06 -3.1 8  
 94000 202.9 10.9 5.3 0.842E-01 0.671E-02 4.3 0.144E-05 0.102E-06 -0.8 6  
 95000 206.5 7.2 5.6 0.684E-01 0.660E-02 0.7 0.115E-05 0.102E-06 -4.6 3  
 96000 238.2 0.0 20.0 0.600E-01 0.000E 00 4.4 0.877E-06 0.000E 00 -12.9 1  
 97000 279.0 0.0 38.5 0.528E-01 0.000E 00 8.4 0.659E-06 0.000E 00 -21.6 1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

SEASONAL MEAN PROFILE

BARROW WINTER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED M/SEC	DIRECTION DEGREES MEAN	NO		WEST ERROR		SOUTH ERROR		NO		TEMP ERROR		OBS
	MEAN	ST DEV	MEAN	ST DEV			M/SEC	DEGREES	MEAN	ST DEV	M/SEC	DEGREES	MEAN	ST DEV	OBS		
30000	38.5	19.7	-28.9	18.4	48.2	306.8	9	2.6	0.9	2.6	0.9	5	0.6	0.1	9		
35000	33.6	22.5	-41.1	19.4	53.1	320.7	14	3.4	2.3	3.5	2.4	7	1.0	0.4	13		
40000	34.6	22.5	-47.0	22.2	58.4	323.6	21	4.3	2.7	4.4	0.7	7	1.9	0.9	20		
45000	32.0	28.8	-50.9	36.3	60.2	327.8	28	6.6	2.2	6.8	2.4	11	2.6	1.0	26		
50000	19.5	24.9	-47.2	40.7	51.1	337.5	23	7.2	2.8	7.4	2.9	9	3.3	1.3	22		
55000	10.1	37.6	-45.3	39.7	46.4	347.3	27	6.3	1.4	6.9	1.3	10	3.7	1.3	25		
60000	6.4	25.4	-24.4	39.3	25.3	345.1	23	8.4	3.2	8.8	3.5	9	4.3	1.8	23		
65000	16.7	21.7	-33.5	42.1	37.4	333.4	20	11.3	3.6	11.8	3.8	9	5.3	1.8	20		
70000	-0.9	24.6	-29.9	51.2	29.9	1.8	24	14.2	7.0	14.9	7.0	11	6.0	2.9	24		
75000	9.1	46.4	5.1	37.6	10.4	240.4	24	15.5	7.7	16.0	8.0	10	6.5	2.8	24		
80000	14.8	65.1	14.2	46.0	20.6	226.1	28	30.5	12.1	30.1	12.2	14	11.0	5.1	28		
85000	17.5	81.7	-3.6	64.6	17.8	281.6	31	34.8	15.8	35.8	15.9	13	13.9	7.1	31		
90000	-14.1	75.1	40.1	124.0	42.5	160.6	21	52.0	33.4	52.3	33.8	8	18.2	11.4	21		
95000	82.8	94.5	-59.7	143.8	102.1	305.8	4	50.8	0.0	47.4	0.0	1	17.3	8.3	4		

Table A.4(b).

SEASONAL MEAN PROFILE  
BARROW SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DIF	MEAN	ST DEV	PCT DIF	DIF	MEAN	ST DEV	PCT DIF	DIF	
25000	228.6	1.5	3.1		0.271E 04	0.200E 02	6.3		0.413E-01	0.593E-03		3.0	2
26000	229.9	0.3	3.3		0.234E 04	0.200E 02	6.9		0.354E-01	0.364E-03		3.4	2
27000	231.4	0.4	3.5		0.201E 04	0.150E 02	7.1		0.303E-01	0.166E-03		3.5	2
28000	233.3	0.8	3.9		0.174E 04	0.150E 02	7.9		0.260E-01	0.134E-03		3.8	2
29000	234.2	0.8	3.8		0.150E 04	0.150E 02	8.2		0.223E-01	0.146E-03		4.2	2
30000	236.4	2.0	4.3		0.131E 04	0.100E 02	9.4		0.193E-01	0.241E-04		4.8	2
31000	237.5	1.7	4.4		0.113E 04	0.150E 02	10.0		0.166E-01	0.373E-04		5.4	2
32000	236.6	0.6	3.5		0.984E 03	0.111E 02	10.6		0.144E-01	0.204E-03		6.8	2
33000	234.9	0.2	1.6		0.852E 03	0.850E 01	11.1		0.126E-01	0.142E-03		9.2	2
34000	235.1	0.7	0.5		0.739E 03	0.800E 01	11.3		0.109E-01	0.155E-03		10.7	2
35000	235.9	0.2	-0.2		0.640E 03	0.700E 01	11.3		0.945E-02	0.115E-03		11.6	2
36000	244.9	6.1	2.3		0.551E 03	0.928E 01	10.6		0.784E-02	0.242E-03		8.1	5
37000	250.0	5.5	3.2		0.486E 03	0.137E 02	12.2		0.677E-02	0.176E-03		8.6	6
38000	253.9	4.4	3.7		0.425E 03	0.126E 02	12.7		0.583E-02	0.134E-03		8.7	6
39000	257.2	4.2	3.8		0.372E 03	0.115E 02	13.4		0.505E-02	0.116E-03		9.1	6
40000	261.5	3.2	4.4		0.327E 03	0.105E 02	14.0		0.436E-02	0.108E-03		9.1	6
41000	266.0	2.7	5.0		0.288E 03	0.960E 01	14.8		0.377E-02	0.109E-03		9.2	6
42000	269.6	3.7	5.3		0.254E 03	0.865E 01	15.5		0.328E-02	0.106E-03		9.6	6
43000	272.8	5.1	5.5		0.224E 03	0.797E 01	16.2		0.286E-02	0.961E-04		10.2	6
44000	276.0	6.4	5.5		0.198E 03	0.726E 01	17.0		0.250E-02	0.852E-04		10.9	6
45000	277.4	7.3	5.0		0.176E 03	0.610E 01	18.1		0.221E-02	0.696E-04		12.5	7
46000	277.7	6.9	4.0		0.157E 03	0.608E 01	19.9		0.197E-02	0.793E-04		15.2	9
47000	278.0	6.4	3.0		0.138E 03	0.621E 01	19.4		0.173E-02	0.748E-04		15.8	10
48000	278.3	5.9	2.8		0.122E 03	0.557E 01	20.0		0.153E-02	0.641E-04		16.6	10
49000	278.4	5.3	2.8		0.108E 03	0.502E 01	20.4		0.136E-02	0.559E-04		17.0	10
50000	278.7	4.2	2.9		0.965E 02	0.457E 01	20.9		0.120E-02	0.510E-04		17.4	10
51000	279.1	3.5	3.1		0.855E 02	0.411E 01	21.4		0.106E-02	0.455E-04		17.7	10
52000	279.4	3.5	3.2		0.759E 02	0.370E 01	21.9		0.946E-03	0.426E-04		18.1	10
53000	278.9	3.4	3.4		0.673E 02	0.333E 01	22.5		0.840E-03	0.379E-04		18.3	10
54000	277.6	3.3	3.7		0.596E 02	0.299E 01	23.0		0.748E-03	0.328E-04		18.5	10
55000	276.2	3.6	4.0		0.528E 02	0.271E 01	23.7		0.666E-03	0.294E-04		18.8	10
56000	275.0	3.6	4.3		0.468E 02	0.244E 01	24.3		0.592E-03	0.262E-04		19.1	10
57000	273.1	3.5	4.3		0.414E 02	0.221E 01	25.0		0.528E-03	0.237E-04		19.7	10
58000	270.5	2.6	4.1		0.366E 02	0.199E 01	25.7		0.471E-03	0.222E-04		20.6	10
59000	267.5	2.1	3.8		0.323E 02	0.178E 01	26.4		0.421E-03	0.207E-04		21.7	10
60000	264.5	2.3	3.4		0.285E 02	0.159E 01	27.0		0.375E-03	0.199E-04		22.7	10
61000	261.2	2.2	2.9		0.251E 02	0.141E 01	27.5		0.334E-03	0.180E-04		23.8	10
62000	257.7	2.4	2.6		0.220E 02	0.125E 01	28.0		0.298E-03	0.161E-04		24.7	10
63000	254.2	2.7	2.8		0.193E 02	0.111E 01	28.5		0.265E-03	0.143E-04		24.9	10
64000	250.8	3.3	3.1		0.169E 02	0.987E 00	28.9		0.235E-03	0.125E-04		25.0	10
65000	246.6	3.3	3.0		0.148E 02	0.877E 00	29.6		0.209E-03	0.111E-04		25.7	10
66000	242.5	3.2	3.0		0.129E 02	0.774E 00	30.2		0.185E-03	0.100E-04		26.4	10
67000	237.9	3.8	2.8		0.112E 02	0.688E 00	30.9		0.165E-03	0.908E-05		27.3	10
68000	233.4	4.7	2.6		0.978E 01	0.608E 00	31.4		0.146E-03	0.815E-05		28.0	10
69000	228.9	5.7	2.4		0.847E 01	0.539E 00	31.9		0.128E-03	0.739E-05		28.8	10
70000	223.7	5.6	1.8		0.731E 01	0.476E 00	32.4		0.113E-03	0.679E-05		30.0	10
71000	217.6	5.2	0.8		0.629E 01	0.441E 00	32.8		0.100E-03	0.637E-05		31.7	9
72000	212.4	4.8	0.2		0.538E 01	0.387E 00	33.0		0.983E-04	0.572E-05		32.6	9
73000	207.0	4.5	-0.4		0.459E 01	0.338E 00	33.0		0.773E-04	0.512E-05		33.6	9
74000	201.3	4.1	-1.3		0.390E 01	0.293E 00	32.9		0.675E-04	0.457E-05		34.7	9
75000	195.5	3.8	-2.3		0.330E 01	0.253E 00	32.6		0.588E-04	0.410E-05		35.7	9
76000	189.7	3.4	-3.2		0.277E 01	0.217E 00	31.9		0.509E-04	0.370E-05		36.4	9
77000	183.9	2.9	-4.3		0.232E 01	0.184E 00	31.0		0.440E-04	0.331E-05		37.1	9
78000	178.3	3.1	-5.3		0.193E 01	0.155E 00	30.0		0.377E-04	0.294E-05		37.4	9
79000	172.4	3.1	-6.5		0.157E 01	0.105E 00	26.3		0.317E-04	0.198E-05		35.1	8

80000	166.4	3.4	-7.8	0.129E-01	0.873E-01	24.4	0.270E-04	0.170E-05	35.0	8
81000	159.9	3.3	-11.4	0.135E-01	0.746E-01	22.3	0.229E-04	0.153E-05	36.1	8
82000	153.7	3.5	-14.9	0.852E-00	0.608E-01	18.9	0.193E-04	0.141E-05	39.9	8
83000	148.4	5.0	-17.8	0.684E-00	0.486E-01	14.8	0.160E-04	0.130E-05	39.8	8
84000	144.4	5.9	-20.0	0.545E-00	0.378E-01	10.0	0.131E-04	0.117E-05	37.8	8
85000	141.9	6.3	-21.4	0.432E-00	0.287E-01	4.8	0.104E-04	0.941E-06	33.7	8
86000	141.6	6.2	-21.6	0.341E-00	0.219E-01	-0.3	0.842E-05	0.707E-06	27.3	8
87000	142.3	6.4	-21.2	0.277E-00	0.168E-01	-5.2	0.663E-05	0.526E-06	20.5	8
88000	143.3	6.9	-20.6	0.214E-00	0.134E-01	-9.7	0.522E-05	0.409E-06	14.0	8
89000	143.9	7.5	-20.3	0.170E-00	0.107E-01	-13.9	0.412E-05	0.337E-06	8.2	8
90000	145.7	10.4	-19.3	0.134E-00	0.930E-02	-18.1	0.323E-05	0.337E-06	2.0	7
91000	148.3	13.4	-19.1	0.106E-00	0.766E-02	-21.9	0.253E-05	0.281E-06	-2.5	6
92000	154.3	18.3	-17.2	0.857E-01	0.670E-02	-25.0	0.195E-05	0.232E-06	-8.2	6
93000	161.9	29.8	-14.5	0.698E-01	0.430E-02	-31.3	0.145E-05	0.211E-06	-17.4	3
94000	160.0	38.6	-16.8	0.510E-01	0.332E-02	-36.7	0.115E-05	0.162E-06	-21.1	2
95000	167.4	42.8	-14.3	0.414E-01	0.650E-02	-39.0	0.885E-06	0.911E-07	-26.8	2
96000	127.9	0.0	-35.5	0.269E-01	0.000E-00	-53.1	0.732E-06	0.000E-00	-27.3	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

BARROW SUMMER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO	
	MEAN	ST DEV	MEAN	ST DEV	M/SEC	MEAN	DEGREES	MEAN	M/SEC	ST DEV	M/SEC	ST DEV	DEGREES	ST DEV	MEAN	OBS
35000	-6.2	5.3	2.6	2.6	6.7	113.2	4	0.0	0.0	0.0	0.0	0.0	0.2	0.1	4	4
40000	-6.8	8.3	0.1	3.2	6.8	91.5	5	0.0	0.0	0.0	0.0	0.0	0.6	0.4	5	5
45000	-12.8	5.2	-2.5	4.3	13.1	78.8	11	0.0	0.0	0.0	0.0	0.0	0.9	0.6	11	11
50000	-14.5	6.4	-6.0	7.1	15.7	67.3	11	0.0	0.0	0.0	0.0	0.0	1.5	0.9	11	11
55000	-16.3	9.7	-1.6	5.6	16.4	94.1	9	0.0	0.0	0.0	0.0	0.0	1.4	0.8	9	9
60000	-25.1	7.1	-4.5	1.4	25.5	79.6	10	0.0	0.0	0.0	0.0	0.0	1.5	0.8	10	10
65000	-22.2	10.0	-4.2	8.9	22.5	79.2	7	0.0	0.0	0.0	0.0	0.0	1.2	0.8	7	7
70000	-34.8	8.7	-0.7	12.7	34.8	88.8	8	0.0	0.0	0.0	0.0	0.0	1.4	0.6	8	8
75000	-38.9	21.3	-11.2	24.6	40.5	73.3	9	0.0	0.0	0.0	0.0	0.0	1.4	0.9	9	9
80000	-46.2	34.6	-20.9	34.0	50.7	55.6	10	0.0	0.0	0.0	0.0	0.0	1.8	0.6	10	10
85000	-17.0	47.7	15.5	45.7	23.1	132.3	10	0.0	0.0	0.0	0.0	0.0	2.6	1.4	10	10
90000	-17.5	88.9	4.2	47.7	19.0	103.5	7	0.0	0.0	0.0	0.0	0.0	7.7	5.5	7	7
95000	-27.8	16.5	0.4	6.9	27.8	90.8	2	0.0	0.0	0.0	0.0	0.0	5.3	0.0	2	2

Table A.4(c).

SEASONAL MEAN PROFILE  
BARROW SPRING/FALL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/SQ M	MEAN	ST DEV	PCT DIF	KG/CU M	
34000	225.3	5.3	-3.5		0.594E 03	0.184E 02	-10.4		0.919E-02	0.460E-03	-7.0		3
35000	233.5	10.0	-1.2		0.529E 03	0.453E 02	-7.8		0.789E-02	0.632E-03	-6.6		11
36000	235.7	9.8	-1.4		0.468E 03	0.477E 02	-5.9		0.692E-02	0.580E-03	-4.6		14
37000	239.5	11.0	-1.0		0.410E 03	0.418E 02	-5.3		0.595E-02	0.465E-03	-4.4		17
38000	241.2	11.0	-1.4		0.356E 03	0.380E 02	-5.4		0.513E-02	0.404E-03	-4.2		17
39000	243.1	10.8	-1.8		0.310E 03	0.345E 02	-5.6		0.443E-02	0.358E-03	-4.0		17
40000	244.9	10.7	-2.1		0.270E 03	0.314E 02	-5.8		0.383E-02	0.323E-03	-4.0		17
41000	246.9	10.4	-2.4		0.235E 03	0.288E 02	-6.1		0.331E-02	0.294E-03	-4.1		17
42000	248.7	10.9	-2.8		0.205E 03	0.262E 02	-6.4		0.287E-02	0.266E-03	-4.0		17
43000	250.5	12.5	-3.0		0.179E 03	0.239E 02	-6.8		0.249E-02	0.242E-03	-4.1		17
44000	252.4	14.7	-3.4		0.157E 03	0.218E 02	-7.1		0.216E-02	0.221E-03	-4.1		17
45000	254.1	16.1	-3.7		0.137E 03	0.200E 02	-7.5		0.188E-02	0.196E-03	-4.1		17
46000	256.5	14.1	-3.8		0.120E 03	0.183E 02	-7.9		0.163E-02	0.174E-03	-4.6		17
47000	258.6	12.7	-4.1		0.106E 03	0.167E 02	-8.3		0.142E-02	0.162E-03	-4.8		17
48000	260.3	12.2	-3.8		0.933E 02	0.152E 02	-8.7		0.124E-02	0.152E-03	-5.5		17
49000	260.8	12.5	-3.6		0.821E 02	0.139E 02	-9.1		0.109E-02	0.138E-03	-6.1		17
50000	260.7	12.5	-3.6		0.722E 02	0.126E 02	-9.4		0.959E-03	0.126E-03	-6.5		17
51000	260.0	12.3	-3.9		0.635E 02	0.115E 02	-9.8		0.846E-03	0.116E-03	-6.6		17
52000	258.9	12.2	-4.3		0.558E 02	0.104E 02	-10.2		0.747E-03	0.107E-03	-6.7		17
53000	257.8	11.9	-4.3		0.490E 02	0.945E 01	-10.6		0.659E-03	0.100E-03	-7.1		17
54000	256.8	11.8	-4.0		0.431E 02	0.853E 01	-11.0		0.581E-03	0.924E-04	-7.9		17
55000	256.6	10.3	-3.3		0.378E 02	0.770E 01	-11.4		0.511E-03	0.856E-04	-8.8		17
56000	256.7	8.8	-2.6		0.332E 02	0.691E 01	-11.7		0.448E-03	0.796E-04	-9.7		17
57000	256.7	8.2	-1.9		0.292E 02	0.618E 01	-11.8		0.394E-03	0.737E-04	-10.5		17
58000	256.1	9.1	-1.3		0.256E 02	0.553E 01	-12.0		0.347E-03	0.676E-04	-11.1		17
59000	253.4	8.0	-1.6		0.224E 02	0.493E 01	-12.2		0.307E-03	0.602E-04	-11.1		17
60000	250.1	7.6	-2.1		0.196E 02	0.439E 01	-12.3		0.272E-03	0.533E-04	-10.8		17
61000	246.2	8.5	-2.9		0.172E 02	0.390E 01	-12.5		0.242E-03	0.479E-04	-10.3		17
62000	243.7	6.9	-2.8		0.152E 02	0.344E 01	-11.6		0.216E-03	0.438E-04	-9.4		16
63000	239.9	5.8	-2.8		0.132E 02	0.308E 01	-11.9		0.191E-03	0.395E-04	-9.7		16
64000	236.3	7.4	-2.8		0.115E 02	0.271E 01	-12.2		0.169E-03	0.353E-04	-10.1		16
65000	233.3	8.2	-2.4		0.100E 02	0.239E 01	-12.4		0.148E-03	0.317E-04	-10.6		16
66000	230.9	8.3	-1.8		0.868E 01	0.210E 01	-12.6		0.130E-03	0.285E-04	-11.3		16
67000	228.8	7.6	-1.0		0.751E 01	0.184E 01	-12.7		0.113E-03	0.257E-04	-12.0		16
68000	226.6	7.6	-0.3		0.649E 01	0.161E 01	-12.7		0.995E-04	0.232E-04	-12.6		16
69000	224.7	8.1	0.5		0.560E 01	0.140E 01	-12.6		0.867E-04	0.206E-04	-13.2		16
70000	223.1	8.7	1.5		0.483E 01	0.122E 01	-12.4		0.752E-04	0.182E-04	-13.9		16
71000	220.9	9.9	2.3		0.415E 01	0.106E 01	-12.1		0.654E-04	0.161E-04	-14.3		16
72000	218.3	12.0	3.0		0.357E 01	0.921E 00	-11.7		0.570E-04	0.142E-04	-14.3		16
73000	214.9	12.1	3.3		0.306E 01	0.797E 00	-11.3		0.496E-04	0.126E-04	-14.2		16
74000	212.3	10.4	4.0		0.261E 01	0.689E 00	-10.8		0.430E-04	0.113E-04	-14.1		16
75000	210.5	11.5	5.1		0.223E 01	0.584E 00	-10.1		0.371E-04	0.101E-04	-14.2		16
76000	209.4	13.5	6.7		0.190E 01	0.494E 00	-9.4		0.320E-04	0.911E-05	-14.3		16
77000	207.8	13.6	8.0		0.162E 01	0.413E 00	-8.4		0.275E-04	0.805E-05	-14.1		16
78000	205.3	12.9	8.9		0.137E 01	0.343E 00	-7.3		0.237E-04	0.699E-05	-13.7		16
79000	201.7	12.3	9.3		0.116E 01	0.282E 00	-6.1		0.204E-04	0.595E-05	-12.9		16
80000	198.0	12.6	9.5		0.986E 00	0.230E 00	-4.8		0.176E-04	0.507E-05	-11.8		16
81000	194.7	14.7	7.7		0.830E 00	0.185E 00	-3.6		0.151E-04	0.433E-05	-8.9		16
82000	193.1	17.1	6.8		0.697E 00	0.148E 00	-2.6		0.128E-04	0.367E-05	-6.9		16
83000	190.2	16.5	5.2		0.589E 00	0.121E 00	-1.0		0.110E-04	0.295E-05	-4.3		15
84000	189.8	15.2	5.0		0.493E 00	0.970E-01	-0.4		0.920E-05	0.233E-05	-3.7		15
85000	192.2	18.1	6.3		0.408E 00	0.777E-01	-0.9		0.753E-05	0.188E-05	-5.3		14
86000	198.0	24.9	9.6		0.337E 00	0.615E-01	-1.6		0.609E-05	0.161E-05	-7.9		13
87000	199.9	26.0	10.6		0.289E 00	0.464E-01	1.5		0.520E-05	0.137E-05	-5.3		12
88000	199.5	26.5	10.4		0.243E 00	0.365E-01	2.5		0.438E-05	0.110E-05	-4.2		12

89000	197.4	24.0	9.2	0.205E 00	0.287E-01	3.7	0.370E-05	0.843E-06	-2.6	12
90000	194.5	26.4	7.6	0.173E 00	0.231E-01	5.7	0.319E-05	0.675E-06	0.6	11
91000	191.9	26.3	4.5	0.145E 00	0.186E-01	6.2	0.269E-05	0.531E-06	3.8	11
92000	179.9	18.8	-3.5	0.122E 00	0.159E-01	7.3	0.240E-05	0.398E-06	12.6	9
93000	173.4	13.5	-8.4	0.104E 00	0.132E-01	9.2	0.213E-05	0.350E-06	20.5	7
94000	161.6	2.5	-16.0	0.889E-01	0.892E-02	10.2	0.192E-05	0.215E-06	31.6	3

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE, 1962

# SEASONAL MEAN PROFILE

BARROW SPRING/FALL

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED M/SEC MEAN	DIRECTION DEGREES MEAN		WEST ERROR M/SEC MEAN ST DEV		SOUTH ERROR M/SEC MEAN ST DEV		TEMP ERROR DEGREES MEAN ST DEV		NO OBS	OBS
	MEAN	ST DEV	MEAN	ST DEV		MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV		
30000	21.3	21.8	3.9	9.7	21.7	259.6	11	2.3	0.9	2.4	0.6	0.7	0.5	10	
35000	16.7	22.8	-0.5	14.0	16.7	271.9	11	3.4	2.0	3.4	2.0	0.9	0.6	11	
40000	13.9	23.0	-0.4	13.1	13.9	271.8	23	2.9	1.3	3.1	1.3	1.3	0.9	21	
45000	16.0	24.9	0.2	15.0	16.0	269.0	21	5.2	2.1	5.6	1.8	2.3	1.4	20	
50000	18.9	27.0	-1.5	14.3	19.0	274.6	27	5.8	2.3	7.2	4.5	3.3	3.6	25	
55000	11.7	34.1	-3.0	12.2	12.1	284.6	22	5.7	1.9	7.1	4.0	3.5	5.0	21	
60000	-1.6	31.1	1.0	24.7	1.9	121.3	24	8.9	1.5	9.3	0.6	3.7	2.8	22	
65000	-2.2	28.9	-3.0	20.9	3.7	36.0	22	9.8	1.7	10.4	2.3	3.2	1.7	21	
70000	0.8	27.0	-2.9	22.3	3.1	343.4	20	11.4	2.4	12.3	2.6	3.7	1.9	19	
75000	3.0	29.5	-1.4	40.6	3.3	295.7	24	24.0	12.0	25.7	13.4	6.8	4.8	22	
80000	-13.3	40.0	2.1	51.3	13.5	99.2	26	41.2	24.0	47.2	29.6	8.4	6.5	25	
85000	21.3	69.9	14.5	114.7	25.8	235.7	27	73.8	69.6	86.9	83.4	15.4	18.2	27	
90000	-3.3	71.7	-0.4	102.7	3.3	82.1	20	108.8	127.9	116.2	131.1	16.7	23.9	20	

## Appendix B

The annual mean temperature, pressure, and density profiles for Natal-Ascension and seasonal mean profiles for Wallops Island, Churchill, and Barrow, along with the corresponding wind parameters and error analyses for temperature and wind, are tabulated in the following tables [comparisons are made with values from "U.S. Standard Atmosphere Supplements, 1966" (Reference 3)] :

Table	Station	Data	Page
B.1	Natal-Ascension	Annual	58
B.2(a)	Wallops Island	Winter	60
B.2(b)		Summer	62
B.2(c)		Spring/Fall	64
B.3(a)	Churchill	Winter	66
B.3(b)		Summer	68
B.3(c)		Spring/Fall	70
B.4(a)	Barrow	Winter	72
B.4(b)		Summer	74
B.4(c)		Spring/Fall	76

Table B.1.

## ANNUAL MEAN PROFILE

## NATAL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/50 M	MEAN	ST DEV	PCT DIF	KG/CU M	
25000	218.1	5.3	-1.4		0.247E 04	0.524E 02	-3.6		0.395E-01	0.606E-03	-2.2		3
26000	223.6	3.9	0.0		0.212E 04	0.492E 02	-3.6		0.331E-01	0.465E-03	-3.7		3
27000	230.8	0.9	2.2		0.183E 04	0.368E 02	-3.5		0.276E-01	0.534E-03	-5.6		3
28000	235.3	1.3	3.2		0.157E 04	0.410E 02	-3.6		0.233E-01	0.705E-03	-6.7		3
29000	236.1	2.4	2.6		0.137E 04	0.326E 02	-3.0		0.202E-01	0.410E-03	-5.4		3
30000	237.0	3.0	2.0		0.119E 04	0.244E 02	-2.5		0.174E-01	0.225E-03	-4.4		3
31000	236.6	4.3	0.8		0.103E 04	0.244E 02	-2.4		0.151E-01	0.127E-03	-3.3		3
32000	239.4	5.5	1.2		0.875E 03	0.337E 02	-4.3		0.127E-01	0.598E-03	-5.3		5
33000	241.1	5.2	0.9		0.762E 03	0.282E 02	-4.0		0.110E-01	0.423E-03	-4.8		5
34000	242.2	4.9	0.5		0.666E 03	0.225E 02	-3.3		0.959E-02	0.344E-03	-3.8		7
35000	244.0	5.1	0.3		0.575E 03	0.320E 02	-4.1		0.821E-02	0.428E-03	-4.4		9
36000	244.7	4.4	-0.2		0.509E 03	0.205E 02	-2.4		0.726E-02	0.300E-03	-2.2		23
37000	247.2	4.1	-0.1		0.446E 03	0.168E 02	-2.1		0.628E-02	0.236E-03	-2.0		30
38000	250.1	3.9	0.1		0.390E 03	0.148E 02	-1.9		0.543E-02	0.202E-03	-2.1		31
39000	252.9	3.9	0.4		0.341E 03	0.131E 02	-1.9		0.470E-02	0.181E-03	-2.3		32
40000	255.6	4.7	0.6		0.298E 03	0.116E 02	-2.0		0.406E-02	0.162E-03	-2.7		33
41000	258.5	4.6	0.9		0.261E 03	0.103E 02	-1.9		0.352E-02	0.142E-03	-2.8		33
42000	261.1	4.6	1.0		0.229E 03	0.920E 01	-1.9		0.306E-02	0.132E-03	-2.9		34
43000	263.1	4.7	1.0		0.202E 03	0.786E 01	-1.7		0.267E-02	0.113E-03	-2.6		34
44000	265.0	5.1	0.8		0.177E 03	0.721E 01	-1.7		0.233E-02	0.103E-03	-2.5		34
45000	266.9	5.7	0.8		0.156E 03	0.616E 01	-1.6		0.204E-02	0.925E-04	-2.3		34
46000	268.2	5.8	0.5		0.138E 03	0.450E 01	-1.5		0.179E-02	0.781E-04	-2.0		34
47000	269.2	5.8	0.0		0.122E 03	0.448E 01	-1.4		0.157E-02	0.672E-04	-1.4		34
48000	269.4	5.6	-0.2		0.107E 03	0.424E 01	-1.5		0.139E-02	0.564E-04	-1.3		34
49000	269.2	5.3	-0.3		0.949E 02	0.396E 01	-1.7		0.122E-02	0.504E-04	-1.3		34
50000	268.4	5.6	-0.6		0.838E 02	0.348E 01	-1.7		0.108E-02	0.448E-04	-1.0		33
51000	267.5	6.1	-0.9		0.740E 02	0.316E 01	-1.8		0.963E-03	0.398E-04	-0.8		33
52000	266.1	6.3	-1.1		0.652E 02	0.281E 01	-2.0		0.853E-03	0.353E-04	-0.8		33
53000	264.6	5.9	-0.9		0.574E 02	0.245E 01	-2.1		0.756E-03	0.305E-04	-1.1		33
54000	262.4	4.1	-1.0		0.505E 02	0.222E 01	-2.4		0.671E-03	0.274E-04	-1.3		33
55000	260.4	3.1	-1.1		0.444E 02	0.194E 01	-2.5		0.594E-03	0.256E-04	-1.4		33
56000	258.7	4.0	-1.0		0.390E 02	0.170E 01	-2.6		0.526E-03	0.240E-04	-1.6		33
57000	256.7	4.7	-1.0		0.343E 02	0.151E 01	-2.8		0.465E-03	0.214E-04	-1.7		33
58000	253.9	4.6	-1.3		0.300E 02	0.134E 01	-3.0		0.412E-03	0.183E-04	-1.6		33
59000	250.6	4.8	-1.8		0.263E 02	0.118E 01	-3.3		0.366E-03	0.161E-04	-1.4		33
60000	247.0	6.1	-2.3		0.230E 02	0.106E 01	-3.5		0.325E-03	0.156E-04	-1.1		33
61000	243.3	6.6	-2.5		0.200E 02	0.933E 00	-3.8		0.287E-03	0.143E-04	-1.3		33
62000	239.7	6.7	-2.6		0.174E 02	0.846E 00	-4.2		0.254E-03	0.129E-04	-1.6		33
63000	235.9	6.6	-2.8		0.152E 02	0.761E 00	-4.6		0.224E-03	0.112E-04	-1.7		33
64000	232.7	6.7	-2.7		0.131E 02	0.662E 00	-5.1		0.197E-03	0.941E-05	-2.4		33
65000	229.5	6.9	-2.6		0.113E 02	0.591E 00	-5.6		0.172E-03	0.803E-05	-2.9		33
66000	226.0	7.3	-2.8		0.982E 01	0.534E 00	-6.0		0.151E-03	0.711E-05	-3.3		33
67000	222.4	8.2	-2.8		0.845E 01	0.496E 00	-6.4		0.132E-03	0.681E-05	-3.6		32
68000	219.2	8.4	-2.8		0.726E 01	0.446E 00	-6.9		0.115E-03	0.627E-05	-4.1		32
69000	215.7	8.6	-2.9		0.622E 01	0.398E 00	-7.4		0.100E-03	0.576E-05	-4.6		32
70000	212.3	9.2	-2.9		0.532E 01	0.358E 00	-7.9		0.874E-04	0.555E-05	-5.0		32
71000	209.4	9.6	-2.7		0.454E 01	0.315E 00	-8.3		0.756E-04	0.526E-05	-5.6		32
72000	207.0	9.4	-2.4		0.387E 01	0.280E 00	-8.7		0.652E-04	0.490E-05	-6.4		31
73000	204.5	8.9	-1.9		0.329E 01	0.243E 00	-9.1		0.561E-04	0.443E-05	-7.2		31
74000	202.4	9.2	-1.3		0.279E 01	0.209E 00	-9.3		0.482E-04	0.418E-05	-7.9		31
75000	201.1	9.8	-0.2		0.236E 01	0.178E 00	-9.6		0.410E-04	0.353E-05	-9.1		31
76000	199.8	10.1	0.7		0.200E 01	0.152E 00	-9.6		0.350E-04	0.286E-05	-10.0		31
77000	198.6	10.2	1.8		0.169E 01	0.134E 00	-9.4		0.297E-04	0.223E-05	-11.0		31
78000	197.9	11.3	3.3		0.143E 01	0.120E 00	-9.2		0.252E-04	0.185E-05	-13.1		30
79000	198.2	10.5	5.3		0.120E 01	0.107E 00	-8.6		0.212E-04	0.153E-05	-13.2		30

80000	199.1	9.8	7.7	0.102E 01	0.963E-01	-7.6	0.178E-04	0.139E-05	-14.2	30
81000	199.4	9.8	9.9	0.865E 00	0.847E-01	-6.3	0.151E-04	0.134E-05	-14.7	30
82000	200.1	10.8	12.4	0.732E 00	0.739E-01	-4.6	0.127E-04	0.124E-05	-15.0	30
83000	200.7	10.7	13.3	0.619E 00	0.644E-01	-2.6	0.107E-04	0.109E-05	-14.0	30
84000	201.6	11.7	13.8	0.525E 00	0.565E-01	-0.4	0.909E-05	0.961E-06	-12.3	30
85000	201.2	12.6	13.6	0.445E 00	0.493E-01	1.7	0.772E-05	0.790E-06	-10.2	30
86000	200.4	15.1	13.1	0.377E 00	0.433E-01	3.9	0.656E-05	0.672E-06	-8.0	30
87000	200.1	16.6	13.0	0.319E 00	0.387E-01	6.0	0.556E-05	0.583E-06	-5.8	30
88000	199.5	16.4	12.6	0.270E 00	0.349E-01	8.2	0.472E-05	0.524E-06	-3.7	29
89000	198.3	17.2	12.0	0.228E 00	0.313E-01	10.4	0.402E-05	0.474E-06	-1.1	29
90000	195.0	20.6	10.1	0.193E 00	0.286E-01	12.5	0.345E-05	0.426E-06	2.5	29
91000	193.1	23.8	0.0	0.163E 00	0.262E-01	0.0	0.296E-05	0.408E-06	0.0	25
92000	196.2	24.4	9.3	0.140E 00	0.245E-01	19.0	0.251E-05	0.358E-06	9.6	21
93000	194.0	21.2	0.0	0.119E 00	0.229E-01	0.0	0.213E-05	0.302E-06	0.0	18
94000	194.0	27.1	6.2	0.106E 00	0.228E-01	29.5	0.190E-05	0.252E-06	22.2	12
95000	204.8	31.2	0.0	0.101E 00	0.211E-01	0.0	0.171E-05	0.226E-06	0.0	7
96000	201.0	36.0	8.2	0.809E-01	0.164E-01	40.5	0.140E-05	0.148E-06	30.9	6
97000	205.9	41.9	0.0	0.710E-01	0.163E-01	0.0	0.119E-05	0.134E-06	0.0	5
98000	196.8	43.2	4.6	0.561E-01	0.171E-01	38.1	0.977E-06	0.157E-06	32.1	3
99000	197.2	44.3	0.0	0.475E-01	0.158E-01	0.0	0.822E-06	0.160E-06	0.0	3
100000	199.5	43.7	4.6	0.402E-01	0.145E-01	39.1	0.686E-06	0.159E-06	33.3	3
101000	218.4	46.5	0.0	0.427E-01	0.820E-02	0.0	0.684E-06	0.150E-07	0.0	2
102000	221.1	50.8	14.0	0.368E-01	0.845E-02	78.0	0.580E-06	0.554E-09	61.2	2
103000	224.3	54.4	0.0	0.316E-01	0.834E-02	0.0	0.488E-06	0.110E-07	0.0	2
104000	226.5	55.5	9.9	0.274E-01	0.819E-02	82.0	0.413E-06	0.243E-07	69.6	2
105000	230.3	56.8	0.0	0.236E-01	0.769E-02	0.0	0.349E-06	0.301E-07	0.0	2
106000	291.1	0.0	33.5	0.280E-01	0.000E 00	150.8	0.335E-06	0.000E 00	96.3	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 15 N ANNUAL  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

#### ANNUAL MEAN PROFILE

#### NATAL

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED M/SEC	DIRECTION DEGREES MEAN	NO OBS		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO OBS	
	MEAN	ST DEV	MEAN	ST DEV			M/SEC	ST DEV	M/SEC	ST DEV	DEGREES	ST DEV	DEGREES	ST DEV		
30000	-10.7	9.1	-0.2	2.1	10.7	88.8	3	0.0	0.0	0.0	0.0	0.0	0.5	0.2	3	0
35000	-7.4	15.8	0.6	8.8	7.4	95.3	27	2.4	0.7	1.8	0.5	3	0.7	0.9	26	3
40000	4.0	22.9	1.3	5.7	4.2	251.6	29	3.1	0.2	2.5	0.1	3	1.1	1.0	28	3
45000	1.8	30.2	1.0	10.7	2.1	238.7	43	5.3	1.0	4.1	0.8	5	2.2	2.3	41	5
50000	8.2	25.4	2.0	12.5	8.5	256.2	34	9.5	3.4	7.3	2.5	4	2.2	1.4	43	4
55000	19.4	20.3	-2.9	18.3	19.7	278.4	44	11.2	4.4	9.4	2.9	5	2.7	1.9	42	5
60000	28.6	20.7	-0.1	16.1	28.6	270.2	39	16.6	6.2	14.0	5.6	4	3.3	2.1	38	4
65000	23.3	16.2	-6.5	20.0	24.2	285.5	33	12.7	4.0	12.5	4.6	3	2.9	2.2	32	3
70000	6.1	27.3	-0.9	16.2	6.1	278.6	40	10.4	2.6	9.6	2.1	6	2.8	2.1	38	6
75000	-5.1	34.7	-0.5	30.5	5.1	84.1	32	11.6	3.0	10.4	1.3	3	3.3	2.2	31	6
80000	-13.3	30.3	-0.9	35.0	13.4	86.0	40	14.8	3.5	12.7	2.0	5	4.4	2.9	39	5
85000	-1.3	42.4	-4.0	55.5	4.2	18.0	52	27.0	6.3	23.4	4.3	3	6.3	3.8	50	4
90000	-35.6	79.1	-18.0	71.3	39.9	63.1	39	35.5	3.6	31.7	3.6	6	8.9	6.1	37	6
95000	-9.3	0.0	-27.5	0.0	29.1	18.6	1	0.0	0.0	0.0	0.0	0	40.7	0.0	1	0

Table B.2(a).

## SEASONAL MEAN PROFILE

WALLOPS WINTER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	NT/SQ M	PCT	DIF	MEAN	KG/CU M	ST DEV	PCT	DIF
33000	233.4	7.9	5.2		0.722E-03	0.939E-01	3.1		0.107E-01	0.326E-03		-1.9	5
34000	236.7	6.1	5.2		0.640E-03	0.274E-02	6.4		0.942E-02	0.420E-03			10
35000	239.8	6.1	5.2		0.550E-03	0.455E-02	6.2		0.800E-02	0.361E-03			13
36000	243.7	6.0	5.5		0.479E-03	0.210E-02	7.1		0.688E-02	0.312E-03			15
37000	248.0	6.8	5.9		0.418E-03	0.180E-02	8.1		0.587E-02	0.277E-03			16
38000	250.1	7.6	5.5		0.365E-03	0.163E-02	8.9		0.508E-02	0.237E-03			18
39000	252.5	6.8	5.1		0.318E-03	0.143E-02	9.5		0.439E-02	0.207E-03			19
40000	253.8	7.1	4.3		0.276E-03	0.135E-02	9.4		0.380E-02	0.180E-03			21
41000	255.1	8.0	3.6		0.241E-03	0.122E-02	9.4		0.329E-02	0.155E-03			23
42000	256.4	9.4	2.8		0.209E-03	0.115E-02	9.1		0.285E-02	0.141E-03			25
43000	260.0	9.1	3.0		0.185E-03	0.110E-02	10.1		0.248E-02	0.128E-03			27
44000	262.6	9.1	2.8		0.162E-03	0.103E-02	10.1		0.215E-02	0.112E-03			28
45000	265.0	9.6	2.5		0.142E-03	0.948E-01	10.4		0.187E-02	0.107E-03			28
46000	267.3	11.0	2.2		0.125E-03	0.863E-01	10.7		0.169E-02	0.102E-03			28
47000	268.2	10.7	1.3		0.110E-03	0.783E-01	10.9		0.149E-02	0.955E-04			28
48000	267.7	9.4	0.7		0.977E-02	0.710E-01	11.1		0.127E-02	0.848E-04			28
49000	266.0	7.5	0.1		0.861E-02	0.637E-01	11.1		0.112E-02	0.764E-04			28
50000	264.0	7.6	-0.6		0.758E-02	0.572E-01	11.0		0.100E-02	0.721E-04			28
51000	262.2	9.0	-1.3		0.667E-02	0.512E-01	10.9		0.887E-03	0.681E-04			28
52000	260.7	9.4	-1.8		0.586E-02	0.457E-01	10.7		0.784E-03	0.595E-04			28
53000	259.0	9.4	-2.0		0.515E-02	0.409E-01	10.3		0.693E-03	0.526E-04			28
54000	257.0	9.5	-2.0		0.452E-02	0.366E-01	10.0		0.613E-03	0.478E-04			28
55000	254.9	10.4	-2.1		0.396E-02	0.326E-01	9.7		0.542E-03	0.444E-04			28
56000	251.9	10.6	-2.5		0.347E-02	0.290E-01	9.3		0.480E-03	0.419E-04			28
57000	249.0	10.6	-2.9		0.303E-02	0.256E-01	8.8		0.425E-03	0.386E-04			28
58000	246.6	9.8	-3.1		0.265E-02	0.224E-01	8.4		0.375E-03	0.347E-04			28
59000	244.6	8.7	-3.1		0.231E-02	0.195E-01	7.8		0.329E-03	0.308E-04			28
60000	242.5	8.0	-3.2		0.201E-02	0.169E-01	7.3		0.289E-03	0.274E-04			28
61000	240.3	8.2	-3.3		0.175E-02	0.145E-01	6.8		0.254E-03	0.246E-04			28
62000	238.3	8.6	-3.4		0.152E-02	0.125E-01	6.2		0.222E-03	0.217E-04			28
63000	236.5	9.1	-3.4		0.132E-02	0.106E-01	5.6		0.195E-03	0.190E-04			28
64000	234.4	8.9	-3.4		0.114E-02	0.913E-00	5.1		0.170E-03	0.163E-04			28
65000	232.5	9.1	-3.4		0.962E-01	0.779E-00	4.5		0.149E-03	0.140E-04			28
66000	230.3	10.1	-3.5		0.858E-01	0.667E-00	3.9		0.130E-03	0.122E-04			28
67000	227.7	11.2	-3.8		0.741E-01	0.573E-00	3.3		0.119E-03	0.106E-04			28
68000	224.1	10.9	-4.5		0.639E-01	0.495E-00	2.7		0.995E-04	0.908E-05			28
69000	221.2	10.4	-4.9		0.549E-01	0.428E-00	1.9		0.868E-04	0.794E-05			28
70000	219.5	9.8	-4.8		0.472E-01	0.367E-00	1.1		0.751E-04	0.700E-05			28
71000	218.5	11.4	-4.3		0.405E-01	0.311E-00	0.3		0.647E-04	0.656E-05			28
72000	219.6	13.0	-3.0		0.346E-01	0.265E-00	-0.5		0.552E-04	0.562E-05			27
73000	220.7	14.3	-1.6		0.297E-01	0.228E-00	-0.9		0.471E-04	0.462E-05			1.1
74000	220.1	15.5	-1.0		0.254E-01	0.196E-00	-1.6		0.404E-04	0.386E-05			25
75000	220.6	17.5	0.1		0.218E-01	0.175E-00	-1.8		0.345E-04	0.319E-05			25
76000	218.3	17.1	0.0		0.186E-01	0.142E-00	-2.6		0.298E-04	0.280E-05			24
77000	216.6	16.6	0.1		0.159E-01	0.129E-00	-2.7		0.257E-04	0.208E-05			24
78000	215.4	14.7	0.5		0.137E-01	0.107E-00	-2.1		0.222E-04	0.172E-05			21
79000	216.0	14.1	1.8		0.114E-01	0.101E-00	-1.7		0.190E-04	0.169E-05			19
80000	212.9	13.1	1.3		0.101E-01	0.874E-01	-0.9		0.166E-04	0.154E-05			18
81000	211.5	13.4	1.6		0.871E-00	0.814E-01	-0.3		0.144E-04	0.135E-05			16
82000	210.7	14.0	2.2		0.743E-00	0.701E-01	-0.1		0.123E-04	0.134E-05			16
83000	209.1	13.8	2.5		0.634E-00	0.606E-01	0.1		0.105E-04	0.109E-05			16
84000	205.8	15.5	1.9		0.539E-00	0.530E-01	0.4		0.916E-05	0.962E-06			1.1
85000	204.4	13.8	2.3		0.449E-00	0.514E-01	-1.2		0.766E-05	0.705E-06			11
86000	200.4	12.6	0.4		0.377E-00	0.464E-01	-2.0		0.656E-05	0.638E-06			10
87000	197.0	13.2	-1.2		0.316E-00	0.420E-01	-3.1		0.559E-05	0.649E-06			9

8000	199.0	8.3	-0.7	0.275E 00	0.377E-01	-0.4	0.484E-05	0.677E-06	0.4	7
89000	199.3	14.8	-0.0	0.227E 00	0.319E-01	-2.5	0.401E-05	0.666E-06	-1.7	6
90000	204.1	22.0	2.3	0.193E 00	0.263E-01	-2.4	0.333E-05	0.600E-06	-3.4	6
91000	194.4	7.6	0.0	0.152E 00	0.842E-03	0.0	0.273E-05	0.917E-07	0.0	2
92000	194.4	7.8	-3.2	0.128E 00	0.103E-02	-9.4	0.230E-05	0.750E-07	-6.0	2
93000	188.0	3.2	0.0	0.107E 00	0.124E-02	0.0	0.199E-05	0.112E-07	0.0	2
94000	182.4	0.0	-11.4	0.890E-01	0.000E 00	-13.2	0.170E-05	0.000E 00	-1.5	1
95000	177.3	0.0	0.0	0.738E-01	0.000E 00	0.0	0.145E-05	0.000E 00	0.0	1
96000	172.1	0.0	-18.2	0.612E-01	0.000E 00	-18.1	0.124E-05	0.000E 00	1.0	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 45 N JANUARY  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

SEASONAL MEAN PROFILE  
WALLOPS WINTER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR		SOUTH ERROR		NO OBS	TEMP ERROR		NO OBS
	MEAN	ST DEV	MEAN	ST DEV				M/SEC	M/SEC	M/SEC	M/SEC		DEGREES	DEGREES	
30000	38.4	19.2	4.0	11.8	38.6	263.9	13	0.6	0.2	1.1	0.1	5	1.4	3.0	11
35000	46.8	29.0	3.9	14.1	47.0	265.2	20	0.7	0.3	1.2	0.3	6	2.7	3.5	17
40000	56.7	34.5	11.1	14.8	57.8	258.9	29	1.1	0.3	1.9	0.6	8	2.8	3.1	22
45000	65.5	34.6	12.7	18.1	66.7	258.9	34	1.6	0.3	2.2	0.3	10	2.6	3.5	27
50000	65.7	38.3	12.5	19.6	66.9	259.1	33	1.5	0.3	2.3	0.5	11	2.9	3.2	26
55000	63.3	34.5	16.4	20.6	65.4	255.4	33	1.7	0.4	2.5	0.5	10	2.7	3.1	27
60000	67.7	33.5	8.6	25.2	68.3	262.7	32	1.6	0.4	2.5	0.6	10	3.3	4.7	25
65000	66.6	42.7	0.0	26.4	66.6	269.9	34	1.5	0.3	2.2	0.3	8	3.6	5.7	27
70000	43.8	45.5	6.3	24.2	44.3	261.7	31	2.1	0.4	3.1	0.5	10	2.9	4.0	24
75000	64.6	38.6	8.6	46.3	65.2	262.3	37	2.8	0.6	4.2	0.8	14	4.6	7.5	32
80000	26.9	34.3	-4.4	50.3	27.3	279.3	32	9.4	17.2	15.3	31.9	12	5.1	7.8	29
85000	8.2	28.6	4.2	62.2	9.2	242.8	17	23.2	48.2	25.4	48.7	9	6.5	10.8	16
90000	3.5	41.6	-43.8	130.2	44.0	355.3	8	9.1	1.9	10.4	2.7	6	4.8	4.9	7
95000	-29.2	0.0	-9.6	0.0	30.8	71.6	1	125.5	0.0	200.3	0.0	1	19.2	0.0	1

Table B.2(b).

## SEASONAL MEAN PROFILE

WALLOPS SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT DIF	DEG K	MEAN	ST DEV	PCT DIF	NT/SQ M	MEAN	ST DEV	PCT DIF	KG/CU M	
25000	223.0	2.0	-0.9	2.0	0.273E 04	0.200E 02	-1.4	0.200E 02	0.426E-01	0.694E-03	-0.5	0.694E-03	2
26000	223.9	1.4	-1.0	1.4	0.234E 04	0.200E 02	-1.8	0.200E 02	0.364E-01	0.546E-03	-0.8	0.546E-03	2
27000	223.9	1.0	-1.5	1.0	0.204E 04	0.374E 02	-0.6	0.374E 02	0.317E-01	0.698E-03	0.9	0.698E-03	3
28000	226.3	0.9	-1.3	0.9	0.175E 04	0.286E 02	-0.9	0.286E 02	0.269E-01	0.369E-03	0.3	0.369E-03	3
29000	226.8	3.2	-2.0	3.2	0.151E 04	0.244E 02	-1.2	0.244E 02	0.231E-01	0.390E-03	0.7	0.390E-03	3
30000	228.6	2.8	-2.1	2.8	0.130E 04	0.216E 02	-1.6	0.216E 02	0.198E-01	0.255E-03	0.4	0.255E-03	3
31000	228.1	4.4	-3.2	4.4	0.112E 04	0.262E 02	-1.8	0.262E 02	0.171E-01	0.339E-03	1.3	0.339E-03	3
32000	230.2	5.5	-3.1	5.5	0.968E 03	0.196E 02	-2.3	0.196E 02	0.146E-01	0.438E-03	0.8	0.438E-03	4
33000	234.3	8.2	-2.4	8.2	0.856E 03	0.452E 02	-0.5	0.452E 02	0.127E-01	0.439E-03	1.8	0.439E-03	6
34000	235.8	8.3	-2.8	8.3	0.741E 03	0.422E 02	-0.9	0.422E 02	0.109E-01	0.407E-03	1.8	0.407E-03	6
35000	239.4	7.8	-2.3	7.8	0.646E 03	0.364E 02	-0.8	0.364E 02	0.939E-02	0.343E-03	1.4	0.343E-03	7
36000	243.0	7.2	-1.8	7.2	0.567E 03	0.359E 02	-0.0	0.359E 02	0.813E-02	0.346E-03	1.7	0.346E-03	8
37000	246.5	7.9	-1.4	7.9	0.496E 03	0.316E 02	0.1	0.316E 02	0.701E-02	0.299E-03	1.4	0.299E-03	9
38000	248.2	8.2	-1.7	8.2	0.429E 03	0.303E 02	-0.9	0.303E 02	0.602E-02	0.275E-03	0.6	0.275E-03	10
39000	252.4	6.2	-1.0	6.2	0.375E 03	0.266E 02	-1.1	0.266E 02	0.517E-02	0.268E-03	-0.2	0.268E-03	11
40000	255.2	6.1	-0.8	6.1	0.325E 03	0.219E 02	-2.1	0.219E 02	0.444E-02	0.245E-03	-1.3	0.245E-03	14
41000	258.1	7.1	-0.7	7.1	0.284E 03	0.192E 02	-2.5	0.192E 02	0.384E-02	0.225E-03	1.8	0.225E-03	15
42000	261.1	9.6	-0.5	9.6	0.250E 03	0.167E 02	-2.6	0.167E 02	0.333E-02	0.202E-03	-2.1	0.202E-03	16
43000	263.2	9.3	-0.6	9.3	0.219E 03	0.151E 02	-2.7	0.151E 02	0.290E-02	0.177E-03	-2.1	0.177E-03	16
44000	264.1	6.4	-1.2	6.4	0.192E 03	0.133E 02	-3.1	0.133E 02	0.254E-02	0.138E-03	-2.0	0.138E-03	18
45000	265.7	6.8	-1.5	6.8	0.170E 03	0.119E 02	-2.8	0.119E 02	0.223E-02	0.119E-03	-1.3	0.119E-03	21
46000	266.5	8.7	-2.1	8.7	0.150E 03	0.102E 02	-3.3	0.102E 02	0.196E-02	0.109E-03	-1.2	0.109E-03	24
47000	266.8	11.9	-2.8	11.9	0.132E 03	0.944E 01	-3.6	0.944E 01	0.172E-02	0.108E-03	-0.7	0.108E-03	24
48000	266.5	14.6	-3.3	14.6	0.116E 03	0.876E 01	-4.0	0.876E 01	0.152E-02	0.104E-03	-0.7	0.104E-03	24
49000	267.1	11.2	-3.1	11.2	0.102E 03	0.810E 01	-4.4	0.810E 01	0.133E-02	0.843E-04	-1.4	0.843E-04	24
50000	267.1	8.1	-3.1	8.1	0.905E 02	0.740E 01	-4.8	0.740E 01	0.117E-02	0.781E-04	-1.8	0.781E-04	24
51000	266.7	6.0	-3.2	6.0	0.798E 02	0.672E 01	-5.2	0.672E 01	0.104E-02	0.770E-04	-2.0	0.770E-04	24
52000	265.7	6.3	-3.6	6.3	0.703E 02	0.598E 01	-5.6	0.598E 01	0.922E-03	0.760E-04	-2.4	0.760E-04	24
53000	264.0	7.3	-3.7	7.3	0.619E 02	0.531E 01	-6.1	0.531E 01	0.817E-03	0.710E-04	-2.4	0.710E-04	24
54000	262.2	7.8	-3.5	7.8	0.544E 02	0.469E 01	-6.5	0.469E 01	0.724E-03	0.653E-04	-3.0	0.653E-04	24
55000	260.5	8.5	-3.2	8.5	0.479E 02	0.409E 01	-7.0	0.409E 01	0.641E-03	0.593E-04	-3.7	0.593E-04	24
56000	258.3	9.0	-3.1	9.0	0.420E 02	0.358E 01	-7.4	0.358E 01	0.568E-03	0.536E-04	-4.2	0.536E-04	24
57000	255.4	9.8	-3.3	9.8	0.369E 02	0.312E 01	-7.8	0.312E 01	0.504E-03	0.483E-04	-4.4	0.483E-04	24
58000	251.9	10.2	-3.7	10.2	0.323E 02	0.273E 01	-8.3	0.273E 01	0.447E-03	0.427E-04	-4.5	0.427E-04	24
59000	248.3	9.6	-4.3	9.6	0.282E 02	0.236E 01	-8.8	0.236E 01	0.397E-03	0.369E-04	-4.6	0.369E-04	24
60000	244.6	9.6	-4.8	9.6	0.246E 02	0.208E 01	-9.4	0.208E 01	0.351E-03	0.320E-04	-4.7	0.320E-04	24
61000	240.5	9.6	-5.5	9.6	0.214E 02	0.180E 01	-10.2	0.180E 01	0.310E-03	0.276E-04	-4.8	0.276E-04	24
62000	236.7	9.4	-6.1	9.4	0.186E 02	0.156E 01	-11.0	0.156E 01	0.274E-03	0.242E-04	-5.1	0.242E-04	24
63000	233.1	8.4	-6.3	8.4	0.161E 02	0.136E 01	-11.8	0.136E 01	0.241E-03	0.210E-04	-5.7	0.210E-04	24
64000	229.5	7.6	-6.1	7.6	0.139E 02	0.118E 01	-12.6	0.118E 01	0.212E-03	0.185E-04	-6.8	0.185E-04	24
65000	225.9	7.0	-5.8	7.0	0.120E 02	0.101E 01	-13.3	0.101E 01	0.185E-03	0.162E-04	-7.9	0.162E-04	24
66000	222.6	6.8	-5.5	6.8	0.103E 02	0.878E 00	-14.2	0.878E 00	0.162E-03	0.146E-04	-9.0	0.146E-04	24
67000	219.4	7.0	-5.1	7.0	0.895E 01	0.762E 00	-14.5	0.762E 00	0.142E-03	0.134E-04	-9.8	0.134E-04	23
68000	215.7	7.4	-4.9	7.4	0.768E 01	0.648E 00	-15.2	0.648E 00	0.124E-03	0.117E-04	-10.7	0.117E-04	23
69000	212.0	7.6	-4.6	7.6	0.656E 01	0.551E 00	-15.8	0.551E 00	0.107E-03	0.100E-04	-11.6	0.100E-04	23
70000	208.4	8.4	-4.4	8.4	0.559E 01	0.470E 00	-16.5	0.470E 00	0.936E-04	0.855E-05	-12.5	0.855E-05	23
71000	205.6	9.4	-3.7	9.4	0.476E 01	0.407E 00	-17.1	0.407E 00	0.807E-04	0.742E-05	-13.7	0.742E-05	23
72000	203.9	10.2	-2.5	10.2	0.404E 01	0.352E 00	-17.5	0.352E 00	0.691E-04	0.623E-05	-15.0	0.623E-05	23
73000	203.3	10.6	-0.7	10.6	0.343E 01	0.308E 00	-17.7	0.308E 00	0.588E-04	0.506E-05	-17.0	0.506E-05	23
74000	203.3	11.0	1.4	11.0	0.291E 01	0.271E 00	-17.7	0.271E 00	0.498E-04	0.422E-05	-18.8	0.422E-05	23
75000	202.8	11.4	3.4	11.4	0.246E 01	0.238E 00	-17.5	0.238E 00	0.424E-04	0.376E-05	-20.1	0.376E-05	23
76000	202.2	12.7	5.5	12.7	0.210E 01	0.208E 00	-16.5	0.208E 00	0.362E-04	0.354E-05	-20.7	0.354E-05	22
77000	201.9	13.3	7.8	13.3	0.179E 01	0.170E 00	-14.8	0.170E 00	0.310E-04	0.308E-05	-20.8	0.308E-05	21
78000	200.4	14.9	9.6	14.9	0.150E 01	0.125E 00	-14.7	0.125E 00	0.262E-04	0.224E-05	-21.9	0.224E-05	20
79000	194.9	13.2	10.3	13.2	0.127E 01	0.110E 00	-12.7	0.110E 00	0.226E-04	0.173E-05	-20.8	0.173E-05	19

ALTITUDE M MSL	WEST COMPONENT			SOUTH COMPONENT			SPEED			DIRECTION			WEST ERROR			SOUTH ERROR			TEMP ERROR		
	M/SEC			M/SEC			M/SEC			DEGREES			M/SEC			M/SEC			DEGREES		
	MEAN	ST DEV	NO	MEAN	ST DEV	NO	MEAN	ST DEV	NO	MEAN	ST DEV	NO	MEAN	ST DEV	NO	MEAN	ST DEV	NO	MEAN	ST DEV	NO
80000	193.7	12.0	11.2	0.107E 01	0.100E 00	-11.1	0.193E-04	0.148E-05	-20.1	0.165E-04	0.135E-05	-19.3	0.193E-04	0.148E-05	-20.1	0.165E-04	0.135E-05	-19.3	0.193E-04	0.135E-05	-19.3
81000	190.9	11.7	12.4	0.906E 00	0.900E-01	-9.3	0.165E-04	0.135E-05	-19.3	0.140E-04	0.114E-05	-18.9	0.165E-04	0.135E-05	-19.3	0.140E-04	0.114E-05	-18.9	0.165E-04	0.135E-05	-19.3
82000	188.0	11.0	13.7	0.755E 00	0.750E-01	-7.8	0.140E-04	0.114E-05	-18.9	0.694E-01	0.611E-01	-5.7	0.140E-04	0.114E-05	-18.9	0.694E-01	0.611E-01	-5.7	0.140E-04	0.114E-05	-18.9
83000	186.5	10.7	12.9	0.631E 00	0.631E-01	-5.7	0.118E-04	0.109E-05	-13.8	0.518E-01	0.443E-01	-0.9	0.118E-04	0.109E-05	-13.8	0.518E-01	0.443E-01	-0.9	0.118E-04	0.109E-05	-13.8
84000	185.8	10.9	12.5	0.530E 00	0.530E-01	-3.1	0.829E-05	0.109E-05	-12.1	0.443E-01	0.369E-01	0.9	0.829E-05	0.109E-05	-12.1	0.443E-01	0.369E-01	0.9	0.829E-05	0.109E-05	-12.1
85000	187.0	12.9	13.3	0.443E 00	0.443E-01	0.9	0.697E-05	0.100E-05	-9.7	0.369E-01	0.297E-01	0.0	0.697E-05	0.100E-05	-9.7	0.369E-01	0.297E-01	0.0	0.697E-05	0.100E-05	-9.7
86000	185.7	14.6	12.5	0.369E 00	0.369E-01	0.9	0.589E-05	0.891E-06	-6.6	0.297E-01	0.246E-01	20.7	0.589E-05	0.891E-06	-6.6	0.297E-01	0.246E-01	20.7	0.589E-05	0.891E-06	-6.6
87000	185.9	16.4	12.6	0.312E 00	0.312E-01	4.1	0.503E-05	0.645E-06	-2.5	0.246E-01	0.197E-01	0.0	0.503E-05	0.645E-06	-2.5	0.246E-01	0.197E-01	0.0	0.503E-05	0.645E-06	-2.5
88000	183.6	15.7	11.2	0.264E 00	0.264E-01	7.8	0.420E-05	0.525E-06	-0.3	0.219E-01	0.170E-01	0.0	0.420E-05	0.525E-06	-0.3	0.219E-01	0.170E-01	0.0	0.420E-05	0.525E-06	-0.3
89000	182.6	15.2	10.6	0.219E 00	0.219E-01	9.8	0.350E-05	0.438E-06	1.5	0.183E-01	0.137E-01	0.0	0.350E-05	0.438E-06	1.5	0.183E-01	0.137E-01	0.0	0.350E-05	0.438E-06	1.5
90000	182.3	15.0	10.4	0.183E 00	0.183E-01	11.8	0.297E-05	0.377E-06	0.0	0.159E-01	0.116E-01	0.0	0.297E-05	0.377E-06	0.0	0.159E-01	0.116E-01	0.0	0.297E-05	0.377E-06	0.0
91000	187.8	15.5	0.0	0.159E 00	0.159E-01	0.0	0.246E-05	0.300E-06	9.4	0.132E-01	0.100E-01	20.7	0.246E-05	0.300E-06	9.4	0.132E-01	0.100E-01	20.7	0.246E-05	0.300E-06	9.4
92000	188.8	19.6	11.0	0.132E 00	0.132E-01	20.7	0.142E-01	0.125E-06	0.0	0.108E-01	0.074E-01	28.6	0.142E-01	0.125E-06	0.0	0.108E-01	0.074E-01	28.6	0.142E-01	0.125E-06	0.0
93000	191.4	22.2	0.0	0.108E 00	0.108E-01	0.0	0.674E-02	0.245E-07	0.0	0.0966E-01	0.067E-01	28.6	0.674E-02	0.245E-07	0.0	0.0966E-01	0.067E-01	28.6	0.674E-02	0.245E-07	0.0
94000	198.4	12.6	12.9	0.966E-01	0.674E-02	28.6	0.406E-02	0.140E-07	17.8	0.793E-01	0.406E-02	29.5	0.406E-02	0.140E-07	17.8	0.793E-01	0.406E-02	29.5	0.406E-02	0.140E-07	17.8
95000	201.5	13.6	0.0	0.793E-01	0.406E-02	29.5	0.420E-02	0.140E-07	17.8	0.673E-01	0.420E-02	29.5	0.420E-02	0.140E-07	17.8	0.673E-01	0.420E-02	29.5	0.420E-02	0.140E-07	17.8
96000	201.2	14.6	11.1	0.673E-01	0.420E-02	29.5	0.430E-02	0.140E-07	17.8	0.571E-01	0.430E-02	33.3	0.430E-02	0.140E-07	17.8	0.571E-01	0.430E-02	33.3	0.430E-02	0.140E-07	17.8
97000	201.8	15.8	0.0	0.571E-01	0.430E-02	33.3	0.489E-01	0.827E-08	24.6	0.489E-01	0.430E-02	33.3	0.489E-01	0.827E-08	24.6	0.489E-01	0.430E-02	33.3	0.489E-01	0.827E-08	24.6
98000	202.4	18.0	8.9	0.489E-01	0.430E-02	33.3	0.412E-01	0.169E-07	0.0	0.412E-01	0.430E-02	33.3	0.412E-01	0.169E-07	0.0	0.412E-01	0.430E-02	33.3	0.412E-01	0.169E-07	0.0
99000	204.0	20.8	0.0	0.412E-01	0.430E-02	33.3	0.350E-01	0.201E-07	30.6	0.350E-01	0.427E-02	35.8	0.350E-01	0.201E-07	30.6	0.350E-01	0.427E-02	35.8	0.350E-01	0.201E-07	30.6
100000	203.0	23.9	6.5	0.350E-01	0.427E-02	35.8	0.296E-01	0.201E-07	30.6	0.296E-01	0.368E-02	28.0	0.296E-01	0.201E-07	30.6	0.296E-01	0.368E-02	28.0	0.296E-01	0.201E-07	30.6
101000	201.5	28.1	0.0	0.296E-01	0.427E-02	35.8	0.236E-01	0.208E-07	37.9	0.236E-01	0.368E-02	28.0	0.236E-01	0.208E-07	37.9	0.236E-01	0.368E-02	28.0	0.236E-01	0.208E-07	37.9
102000	189.0	25.9	-4.3	0.236E-01	0.368E-02	28.0	0.198E-01	0.205E-07	0.0	0.198E-01	0.350E-02	22.7	0.198E-01	0.205E-07	0.0	0.198E-01	0.350E-02	22.7	0.198E-01	0.205E-07	0.0
103000	188.0	27.4	0.0	0.198E-01	0.350E-02	22.7	0.166E-01	0.238E-07	42.6	0.166E-01	0.350E-02	22.7	0.166E-01	0.238E-07	42.6	0.166E-01	0.350E-02	22.7	0.166E-01	0.238E-07	42.6
104000	189.6	26.3	-11.4	0.166E-01	0.350E-02	22.7	0.140E-01	0.297E-07	0.0	0.140E-01	0.308E-02	0.0	0.140E-01	0.297E-07	0.0	0.140E-01	0.308E-02	0.0	0.140E-01	0.297E-07	0.0
105000	198.2	24.1	0.0	0.140E-01	0.308E-02	0.0	0.119E-01	0.367E-07	30.2	0.119E-01	0.277E-02	17.7	0.119E-01	0.367E-07	30.2	0.119E-01	0.277E-02	17.7	0.119E-01	0.367E-07	30.2
106000	216.0	18.0	-6.1	0.119E-01	0.277E-02	17.7	0.103E-01	0.378E-07	0.0	0.103E-01	0.243E-02	0.0	0.103E-01	0.378E-07	0.0	0.103E-01	0.243E-02	0.0	0.103E-01	0.378E-07	0.0
107000	233.8	15.9	0.0	0.103E-01	0.243E-02	0.0	0.090E-02	0.333E-07	0.0	0.090E-02	0.210E-02	15.3	0.090E-02	0.333E-07	0.0	0.090E-02	0.210E-02	15.3	0.090E-02	0.333E-07	0.0
108000	248.8	21.8	0.9	0.090E-02	0.210E-02	15.3	0.0793E-02	0.186E-07	0.0	0.0793E-02	0.210E-02	15.3	0.0793E-02	0.186E-07	0.0	0.0793E-02	0.210E-02	15.3	0.0793E-02	0.186E-07	0.0
109000	262.4	25.2	0.0	0.0793E-02	0.186E-07	0.0	0.700E-02	0.174E-07	0.0	0.700E-02	0.164E-02	14.6	0.700E-02	0.174E-07	0.0	0.700E-02	0.164E-02	14.6	0.700E-02	0.174E-07	0.0
110000	278.5	31.5	6.1	0.700E-02	0.174E-07	0.0	0.599E-02	0.164E-07	0.0	0.599E-02	0.160E-02	12.0	0.599E-02	0.164E-07	0.0	0.599E-02	0.160E-02	12.0	0.599E-02	0.164E-07	0.0
111000	323.2	12.0	0.0	0.599E-02	0.164E-07	0.0	0.544E-02	0.160E-07	-6.1	0.544E-02	0.160E-02	12.0	0.544E-02	0.160E-07	-6.1	0.544E-02	0.160E-02	12.0	0.544E-02	0.160E-07	-6.1
112000	349.6	17.1	25.4	0.544E-02	0.160E-07	-6.1	0.497E-02	0.113E-07	0.0	0.497E-02	0.148E-02	0.0	0.497E-02	0.113E-07	0.0	0.497E-02	0.148E-02	0.0	0.497E-02	0.113E-07	0.0
113000	373.2	20.5	0.0	0.497E-02	0.148E-02	0.0	0.456E-02	0.099E-08	-5.6	0.456E-02	0.138E-02	16.3	0.456E-02	0.099E-08	-5.6	0.456E-02	0.138E-02	16.3	0.456E-02	0.099E-08	-5.6
114000	394.9	22.0	29.8	0.456E-02	0.138E-02	16.3	0.421E-02	0.0903E-08	0.0	0.421E-02	0.130E-02	0.0	0.421E-02	0.0903E-08	0.0	0.421E-02	0.130E-02	0.0	0.421E-02	0.0903E-08	0.0
115000	414.5	22.5	0.0	0.421E-02	0.130E-02	0.0	0.391E-02	0.819E-08	0.0	0.391E-02	0.121E-02	21.0	0.391E-02	0.819E-08	0.0	0.391E-02	0.121E-02	21.0	0.391E-02	0.819E-08	0.0
116000	429.7	23.3	30.4	0.391E-02	0.121E-02	21.0	0.362E-02	0.752E-08	0.0	0.362E-02	0.114E-02	0.0	0.362E-02	0.752E-08	0.0	0.362E-02	0.114E-02	0.0	0.362E-02	0.752E-08	0.0
117000	442.7	24.0	0.0	0.362E-02	0.114E-02	0.0	0.334E-02	0.639E-08	3.4	0.334E-02	0.107E-02	24.7	0.334E-02	0.639E-08	3.4	0.334E-02	0.107E-02	24.7	0.334E-02	0.639E-08	3.4
118000	454.7	23.5	28.2	0.334E-02	0.107E-02	24.7	0.314E-02	0.584E-08	0.0	0.314E-02	0.100E-02	0.0	0.314E-02	0.584E-08	0.0	0.314E-02	0.100E-02	0.0	0.314E-02	0.584E-08	0.0
119000	463.8	23.7	0.0	0.314E-02	0.100E-02	0.0	0.293E-02	0.584E-08	0.0	0.293E-02	0.0959E-03	0.0	0.293E-02	0.584E-08	0.0	0.293E-02	0.0959E-03	0.0	0.293E-02	0.584E-08	0.0
120000	475.1	26.7	0.0	0.293E-02	0.0959E-03	0.0															

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 45 N JULY  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

# SEASONAL MEAN PROFILE

## WALLOPS SUMMER

Table B.2(c).

SEASONAL MEAN PROFILE  
WALLOPS SPRING/FALL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/SQ M				KG/CU M				
29000	228.3	0.0	1.2		0.144E 04	0.000E 00	3.7		0.220E-01	0.000E 00	2.4		1
30000	226.6	4.5	0.0		0.118E 04	0.621E 02	-1.2		0.181E-01	0.587E-03	-1.3		2
31000	230.7	3.7	1.4		0.104E 04	0.599E 02	1.6		0.158E-01	0.675E-03	0.1		3
32000	233.8	3.1	2.3		0.905E 03	0.542E 02	1.8		0.134E-01	0.667E-03	-0.5		3
33000	236.1	5.1	2.2		0.786E 03	0.391E 02	2.4		0.115E-01	0.392E-03	0.1		5
34000	238.7	5.1	2.1		0.680E 03	0.324E 02	2.5		0.099E-02	0.461E-03	0.4		10
35000	242.5	5.0	2.5		0.593E 03	0.257E 02	3.3		0.855E-02	0.374E-03	0.7		13
36000	246.0	6.3	2.8		0.512E 03	0.271E 02	2.8		0.726E-02	0.397E-03	0.0		19
37000	249.7	6.0	3.1		0.446E 03	0.233E 02	3.0		0.623E-02	0.342E-03	-0.0		20
38000	252.4	6.7	3.2		0.390E 03	0.204E 02	3.5		0.537E-02	0.292E-03	0.2		20
39000	255.5	7.0	3.1		0.341E 03	0.176E 02	3.7		0.465E-02	0.244E-03	0.5		22
40000	258.5	6.8	3.2		0.300E 03	0.168E 02	4.7		0.405E-02	0.209E-03	1.3		23
41000	260.3	7.3	2.8		0.262E 03	0.157E 02	4.7		0.351E-02	0.178E-03	1.7		24
42000	262.3	7.4	2.5		0.230E 03	0.141E 02	4.6		0.305E-02	0.152E-03	2.0		26
43000	263.8	7.9	2.0		0.201E 03	0.148E 02	4.3		0.265E-02	0.155E-03	2.2		31
44000	265.0	7.7	1.3		0.177E 03	0.132E 02	4.5		0.232E-02	0.138E-03	3.0		34
45000	265.0	7.8	0.3		0.155E 03	0.118E 02	4.3		0.204E-02	0.124E-03	3.9		38
46000	265.4	7.8	-0.5		0.136E 03	0.107E 02	4.3		0.179E-02	0.115E-03	4.8		38
47000	266.1	8.1	-1.3		0.120E 03	0.965E 01	4.0		0.157E-02	0.105E-03	5.4		39
48000	266.7	7.7	-1.4		0.106E 03	0.872E 01	3.9		0.138E-02	0.945E-04	5.3		39
49000	266.8	7.9	-1.4		0.932E 02	0.838E 01	3.2		0.121E-02	0.896E-04	4.5		40
50000	266.8	8.3	-1.4		0.822E 02	0.761E 01	3.0		0.107E-02	0.819E-04	4.4		40
51000	266.0	8.4	-1.7		0.742E 02	0.690E 01	2.8		0.947E-03	0.728E-04	4.4		40
52000	264.5	8.0	-2.2		0.638E 02	0.625E 01	2.5		0.839E-03	0.660E-04	4.7		40
53000	262.3	7.7	-2.6		0.561E 02	0.564E 01	2.2		0.744E-03	0.613E-04	4.8		40
54000	260.1	8.1	-2.7		0.493E 02	0.509E 01	1.8		0.660E-03	0.582E-04	4.6		40
55000	258.0	9.2	-2.8		0.433E 02	0.457E 01	1.4		0.585E-03	0.543E-04	4.3		40
56000	256.2	8.7	-2.7		0.380E 02	0.409E 01	1.1		0.517E-03	0.505E-04	3.9		40
57000	254.3	8.1	-2.7		0.333E 02	0.366E 01	0.7		0.457E-03	0.466E-04	3.6		40
58000	251.6	7.4	-3.0		0.292E 02	0.324E 01	0.2		0.404E-03	0.430E-04	3.3		40
59000	249.0	7.1	-3.3		0.255E 02	0.286E 01	-0.1		0.357E-03	0.394E-04	3.3		40
60000	246.4	6.0	-3.6		0.223E 02	0.252E 01	-0.6		0.315E-03	0.347E-04	3.1		40
61000	243.6	5.1	-4.0		0.194E 02	0.221E 01	-1.1		0.278E-03	0.304E-04	2.9		40
62000	241.0	4.5	-3.9		0.169E 02	0.196E 01	-1.5		0.245E-03	0.271E-04	2.4		39
63000	238.8	5.0	-3.3		0.148E 02	0.171E 01	-1.8		0.215E-03	0.236E-04	1.5		40
64000	236.1	4.6	-2.9		0.128E 02	0.150E 01	-2.2		0.189E-03	0.211E-04	0.6		40
65000	233.5	4.7	-2.4		0.111E 02	0.130E 01	-2.6		0.166E-03	0.191E-04	-0.1		40
66000	230.8	5.0	-1.9		0.964E 01	0.114E 01	-2.9		0.145E-03	0.173E-04	-0.9		40
67000	228.4	5.8	-1.3		0.834E 01	0.988E 00	-3.1		0.127E-03	0.155E-04	-1.7		40
68000	226.0	6.6	-0.6		0.716E 01	0.826E 00	-3.7		0.110E-03	0.138E-04	-3.0		39
69000	223.8	7.5	0.1		0.617E 01	0.715E 00	-3.8		0.964E-04	0.122E-04	-3.7		39
70000	221.2	8.6	0.6		0.529E 01	0.614E 00	-4.0		0.836E-04	0.108E-04	-4.3		38
71000	218.7	9.8	0.9		0.454E 01	0.523E 00	-3.9		0.725E-04	0.929E-05	-4.5		38
72000	216.7	11.3	1.2		0.389E 01	0.446E 00	-3.8		0.628E-04	0.797E-05	-4.8		38
73000	213.9	12.2	1.3		0.333E 01	0.381E 00	-3.7		0.544E-04	0.683E-05	-4.7		38
74000	210.5	12.2	1.1		0.284E 01	0.327E 00	-3.6		0.472E-04	0.598E-05	-4.4		38
75000	207.4	11.8	1.0		0.242E 01	0.269E 00	-3.6		0.408E-04	0.546E-05	-4.3		36
76000	204.6	12.2	1.1		0.205E 01	0.226E 00	-3.5		0.352E-04	0.471E-05	-4.2		36
77000	202.0	13.2	1.3		0.174E 01	0.188E 00	-3.5		0.302E-04	0.410E-05	-4.2		36
78000	199.8	13.1	1.7		0.147E 01	0.155E 00	-3.4		0.256E-04	0.354E-05	-4.5		36
79000	197.8	13.1	1.7		0.125E 01	0.120E 00	-2.5		0.222E-04	0.288E-05	-4.4		35
80000	198.4	13.5	4.0		0.108E 01	0.999E-01	-1.9		0.187E-04	0.219E-05	-5.4		35
81000	199.0	17.5	4.4		0.899E 00	0.854E-01	-1.1		0.158E-04	0.189E-05	-4.7		34
82000	196.7	15.5	3.2		0.749E 00	0.619E-01	-1.9		0.139E-04	0.154E-05	-4.3		32
83000	195.9	14.7	2.8		0.631E 00	0.517E-01	-1.5		0.115E-04	0.123E-05	-3.6		32

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
84000	194.5	14.3	2.0	0.531E-00	0.441E-01	-1.2	0.957E-05	0.100E-05	32
85000	193.3	14.7	1.4	0.447E-00	0.380E-01	-1.0	0.810E-05	0.825E-06	32
86000	194.1	14.9	1.8	0.376E-00	0.337E-01	-0.8	0.678E-05	0.584E-06	31
87000	195.9	15.5	2.8	0.515E-00	0.288E-01	-0.4	0.562E-05	0.627E-06	28
88000	197.7	17.1	3.7	0.266E-00	0.260E-01	-0.4	0.472E-05	0.529E-06	25
89000	196.7	21.2	3.2	0.226E-00	0.240E-01	0.4	0.403E-05	0.478E-06	21
90000	198.6	28.1	4.2	0.192E-00	0.212E-01	1.9	0.342E-05	0.467E-06	19
91000	197.5	16.4	0.0	0.166E-00	0.205E-01	0.0	0.294E-05	0.400E-06	13
92000	196.9	17.0	2.9	0.142E-00	0.175E-01	6.6	0.253E-05	0.377E-06	10
93000	194.0	5.0	0.0	0.123E-00	0.175E-02	0.0	0.222E-05	0.149E-06	5
94000	191.7	5.4	-1.6	0.101E-00	0.289E-02	7.4	0.185E-05	0.102E-06	3
95000	195.0	8.8	0.0	0.872E-01	0.184E-02	0.0	0.156E-05	0.104E-06	0
96000	199.3	4.8	0.7	0.736E-01	0.105E-02	8.5	0.128E-05	0.493E-07	2
97000	196.7	2.1	0.0	0.624E-01	0.699E-03	0.0	0.110E-05	0.244E-07	2
98000	193.6	0.5	-3.2	0.526E-01	0.495E-03	7.6	0.946E-06	0.506E-08	2
99000	196.3	10.6	0.0	0.443E-01	0.649E-03	0.0	0.788E-06	0.312E-07	2
100000	191.9	14.4	-5.3	0.373E-01	0.999E-03	5.3	0.679E-06	0.329E-07	2
101000	185.9	15.4	0.0	0.313E-01	0.124E-02	0.0	0.589E-06	0.254E-07	2
102000	185.3	12.4	-10.0	0.261E-01	0.140E-02	1.1	0.491E-06	0.681E-08	2
103000	199.8	12.8	0.0	0.220E-01	0.140E-02	0.0	0.383E-06	0.254E-09	2
104000	215.5	2.8	1.1	0.187E-01	0.134E-02	-1.4	0.302E-06	0.178E-07	2
105000	222.9	3.9	0.0	0.161E-01	0.114E-02	0.0	0.252E-06	0.225E-07	2
106000	223.1	4.6	1.4	0.139E-01	0.950E-03	-1.5	0.218E-06	0.194E-07	2
107000	220.8	2.9	0.0	0.120E-01	0.800E-03	0.0	0.189E-06	0.151E-07	2
108000	219.9	0.9	-3.0	0.103E-01	0.664E-03	-3.2	0.163E-06	0.982E-08	2
109000	216.1	0.0	0.0	0.890E-02	0.590E-03	0.0	0.143E-06	0.957E-08	2
110000	212.6	0.2	-8.9	0.763E-02	0.499E-03	-6.1	0.125E-06	0.801E-08	2
111000	219.6	1.0	0.0	0.654E-02	0.429E-03	0.0	0.103E-06	0.632E-08	2
112000	248.4	4.7	3.0	0.566E-02	0.365E-03	-9.2	0.795E-07	0.665E-08	2
113000	295.2	8.6	0.0	0.501E-02	0.315E-03	0.0	0.593E-07	0.546E-08	2
114000	339.5	14.7	25.7	0.452E-02	0.259E-03	-7.6	0.465E-07	0.469E-08	2
115000	378.1	19.6	0.0	0.412E-02	0.220E-03	0.0	0.381E-07	0.401E-08	2
116000	403.1	24.1	35.0	0.379E-02	0.179E-03	-3.7	0.329E-07	0.352E-08	2
117000	419.1	27.0	0.0	0.349E-02	0.154E-03	0.0	0.292E-07	0.318E-08	2
118000	431.9	32.9	32.1	0.322E-02	0.124E-03	-0.2	0.262E-07	0.301E-08	2
119000	441.0	37.7	0.0	0.299E-02	0.950E-04	0.0	0.238E-07	0.279E-08	2
120000	445.4	43.7	0.0	0.277E-02	0.749E-04	0.0	0.219E-07	0.274E-08	2

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 MID LAT SPRING/FALL  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

#### SEASONAL MEAN PROFILE

#### WALLOPS SPRING/FALL

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
25000	-18.9	0.0	12.9	93.0	1	0.0	0.0	0.0	1
30000	4.5	10.7	4.7	286.2	12	0.5	0.9	0.2	10
35000	14.5	17.7	15.7	292.4	18	0.7	1.1	0.3	5
40000	24.0	23.8	8.6	276.2	38	0.8	1.6	0.5	5
45000	28.3	31.3	28.4	272.7	45	1.2	2.2	1.3	1.7
50000	28.2	31.6	28.2	270.8	40	1.5	2.2	2.3	2.3
55000	23.5	33.0	23.8	261.2	46	1.6	2.8	1.6	1.6
60000	19.0	36.6	19.0	257.6	43	7.3	43.2	1.0	38
65000	18.2	38.4	19.1	251.9	42	44.2	71.6	1.9	32
70000	21.0	36.8	21.1	265.8	40	24.2	49.8	2.3	2.7
75000	1.8	42.1	2.0	245.6	42	2.8	4.0	1.9	2.5
80000	15.6	34.9	15.7	263.6	42	4.7	7.1	2.1	3.2
85000	1.7	45.5	10.5	350.6	44	6.1	7.6	2.9	3.8
90000	0.3	56.0	5.3	356.5	22	55.2	56.6	4.8	5.0
								8.8	12.0

Table B.3(a).

## SEASONAL MEAN PROFILE

CHURCHILL WINTER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/SQ M				KG/CU M				
26000	203.3	3.0	-4.1		0.180E 04	0.350E 02	-6.0		0.309E-01	0.106E-02	-2.0		2
27000	204.7	4.0	-4.3		0.152E 04	0.169E 02	-6.7		0.261E-01	0.806E-03	-2.4		3
28000	206.5	4.3	-3.5		0.129E 04	0.129E 02	-7.1		0.218E-01	0.645E-03	-3.7		4
29000	209.1	3.2	-2.7		0.110E 04	0.829E 01	-7.6		0.183E-01	0.398E-03	-4.9		4
30000	211.3	1.9	-2.1		0.937E 03	0.517E 01	-8.0		0.154E-01	0.205E-03	-6.0		4
31000	212.4	2.0	-2.0		0.799E 03	0.424E 01	-8.3		0.131E-01	0.189E-03	-6.4		4
32000	213.8	2.5	-1.8		0.682E 03	0.223E 01	-8.6		0.111E-01	0.153E-03	-6.8		4
33000	215.3	2.2	-1.6		0.582E 03	0.199E 01	-8.9		0.941E-02	0.101E-03	-7.4		4
34000	214.7	3.6	-2.3		0.516E 03	0.268E 02	-5.6		0.838E-02	0.489E-03	-3.3		8
35000	217.8	7.2	-2.0		0.454E 03	0.318E 02	-5.3		0.727E-02	0.462E-03	-1.2		13
36000	218.3	9.9	-2.8		0.395E 03	0.304E 02	-2.0		0.631E-02	0.465E-03	0.8		17
37000	221.1	9.7	-2.6		0.339E 03	0.237E 02	-2.3		0.535E-02	0.384E-03	0.4		19
38000	223.8	10.2	-2.5		0.292E 03	0.230E 02	-2.6		0.454E-02	0.329E-03	0.0		19
39000	226.6	10.7	-2.3		0.251E 03	0.206E 02	-3.0		0.386E-02	0.283E-03	-0.6		19
40000	229.4	10.6	-2.1		0.216E 03	0.183E 02	-3.3		0.329E-02	0.238E-03	-1.0		20
41000	232.8	11.3	-1.7		0.190E 03	0.205E 02	-1.8		0.285E-02	0.243E-03	-0.1		22
42000	235.1	11.9	-1.8		0.166E 03	0.193E 02	-1.2		0.246E-02	0.229E-03	0.5		26
43000	237.9	11.8	-1.7		0.144E 03	0.168E 02	-1.3		0.211E-02	0.200E-03	0.3		28
44000	241.0	12.4	-1.4		0.125E 03	0.151E 02	-1.5		0.181E-02	0.184E-03	-0.1		28
45000	244.0	13.3	-1.2		0.109E 03	0.136E 02	-1.7		0.156E-02	0.168E-03	-0.4		28
46000	246.9	14.3	-1.0		0.953E 02	0.121E 02	-1.8		0.134E-02	0.154E-03	-0.8		28
47000	249.0	14.7	-1.1		0.832E 02	0.108E 02	-2.0		0.116E-02	0.139E-03	-0.8		28
48000	249.8	14.2	-1.7		0.726E 02	0.975E 01	-2.2		0.101E-02	0.123E-03	-0.4		28
49000	249.9	13.5	-2.7		0.638E 02	0.874E 01	-2.5		0.884E-03	0.109E-03	0.1		28
50000	250.1	12.9	-3.5		0.554E 02	0.781E 01	-2.9		0.772E-03	0.971E-04	0.5		28
51000	250.4	12.0	-3.7		0.488E 02	0.717E 01	-2.7		0.679E-03	0.934E-04	1.0		29
52000	251.3	12.2	-3.4		0.427E 02	0.635E 01	-3.1		0.592E-03	0.847E-04	0.2		29
53000	251.9	13.4	-3.1		0.373E 02	0.562E 01	-3.6		0.517E-03	0.769E-04	-0.3		29
54000	252.2	15.5	-3.0		0.328E 02	0.497E 01	-4.0		0.452E-03	0.696E-04	-0.8		29
55000	251.5	16.3	-2.8		0.285E 02	0.439E 01	-4.5		0.396E-03	0.618E-04	-1.4		29
56000	250.3	14.9	-2.6		0.249E 02	0.388E 01	-4.9		0.348E-03	0.538E-04	-2.1		29
57000	249.1	13.6	-2.4		0.218E 02	0.342E 01	-5.3		0.305E-03	0.476E-04	-2.7		29
58000	248.0	12.6	-2.2		0.190E 02	0.300E 01	-5.5		0.268E-03	0.426E-04	-3.2		29
59000	246.8	12.1	-2.0		0.165E 02	0.263E 01	-5.9		0.235E-03	0.385E-04	-3.7		29
60000	245.4	12.3	-2.1		0.145E 02	0.228E 01	-6.1		0.206E-03	0.348E-04	-3.8		29
61000	244.3	13.0	-2.4		0.126E 02	0.198E 01	-6.5		0.181E-03	0.314E-04	-3.8		29
62000	242.7	13.6	-2.8		0.110E 02	0.171E 01	-6.9		0.158E-03	0.281E-04	-3.7		29
63000	240.5	13.3	-3.5		0.957E 01	0.147E 01	-7.4		0.139E-03	0.242E-04	-3.6		29
64000	237.8	13.0	-4.4		0.831E 01	0.126E 01	-8.0		0.122E-03	0.209E-04	-3.3		29
65000	235.4	12.9	-5.2		0.722E 01	0.109E 01	-8.6		0.107E-03	0.180E-04	-3.2		29
66000	234.0	11.5	-5.6		0.625E 01	0.937E 00	-9.4		0.934E-04	0.154E-04	-3.6		29
67000	233.4	11.1	-5.6		0.541E 01	0.803E 00	-10.2		0.811E-04	0.134E-04	-4.4		29
68000	233.1	11.3	-5.5		0.469E 01	0.687E 00	-11.0		0.703E-04	0.118E-04	-5.3		29
69000	232.5	12.0	-5.6		0.405E 01	0.585E 00	-11.7		0.611E-04	0.103E-04	-6.0		29
70000	232.5	12.6	-5.2		0.351E 01	0.496E 00	-12.5		0.529E-04	0.905E-05	-7.1		29
71000	232.3	13.9	-4.5		0.303E 01	0.421E 00	-13.2		0.458E-04	0.777E-05	-8.5		29
72000	231.9	15.2	-3.7		0.262E 01	0.357E 00	-13.8		0.397E-04	0.678E-05	-9.8		29
73000	231.4	16.8	-3.1		0.227E 01	0.300E 00	-14.4		0.344E-04	0.596E-05	-10.9		29
74000	229.9	17.0	-2.8		0.194E 01	0.251E 00	-14.9		0.299E-04	0.516E-05	-11.6		29
75000	227.6	17.1	-2.9		0.165E 01	0.210E 00	-15.4		0.261E-04	0.448E-05	-12.0		29
76000	224.9	17.3	-3.2		0.145E 01	0.175E 00	-15.9		0.227E-04	0.380E-05	-12.3		29
77000	223.6	17.7	-2.9		0.125E 01	0.148E 00	-16.3		0.197E-04	0.325E-05	-13.0		29
78000	221.4	18.8	-2.9		0.107E 01	0.126E 00	-16.7		0.171E-04	0.276E-05	-13.4		28
79000	218.5	18.6	-3.3		0.924E 00	0.106E 00	-17.3		0.148E-04	0.224E-05	-13.7		28
80000	216.2	20.3	-3.4		0.794E 00	0.909E-01	-17.7		0.129E-04	0.187E-05	-14.0		28

216.2	20.5	-2.5	0.682E 00	0.792E-01	-17.8	0.110E-04	0.159E-05	-15.1	27
216.4	18.7	-1.4	0.584E 00	0.683E-01	-18.2	0.947E-05	0.132E-05	-16.4	27
216.4	20.5	-0.4	0.500E 00	0.589E-01	-18.4	0.812E-05	0.120E-05	-17.3	27
213.9	17.5	-0.6	0.430E 00	0.502E-01	-18.4	0.705E-05	0.101E-05	-17.2	26
212.1	12.9	-0.4	0.367E 00	0.427E-01	-18.4	0.606E-05	0.821E-06	-17.6	26
209.7	12.4	-0.5	0.313E 00	0.355E-01	-18.5	0.523E-05	0.744E-06	-17.6	26
207.6	15.9	-0.5	0.267E 00	0.299E-01	-18.5	0.452E-05	0.701E-06	-17.3	25
209.2	16.9	1.2	0.226E 00	0.256E-01	-19.4	0.380E-05	0.571E-06	-19.3	23
208.0	20.5	1.7	0.194E 00	0.182E-01	-18.4	0.328E-05	0.498E-06	-18.9	21
212.2	24.3	4.9	0.163E 00	0.142E-01	-19.2	0.270E-05	0.347E-06	-22.1	19
213.1	28.2	0.0	0.138E 00	0.125E-01	0.0	0.228E-05	0.298E-06	0.0	18
212.9	19.1	3.5	0.117E 00	0.116E-01	-19.5	0.192E-05	0.176E-06	-21.8	17
211.3	9.7	0.0	0.100E 00	0.874E-02	0.0	0.165E-05	0.147E-06	0.0	15
207.1	10.0	-1.0	0.855E-01	0.681E-02	-19.4	0.144E-05	0.142E-06	-17.9	11
202.1	13.2	0.0	0.701E-01	0.461E-02	0.0	0.121E-05	0.124E-06	0.0	8
196.0	15.8	-7.8	0.594E-01	0.386E-02	-23.3	0.106E-05	0.121E-06	-15.4	8
200.2	8.7	0.0	0.510E-01	0.345E-02	0.0	0.888E-06	0.662E-07	0.0	5
199.1	6.2	-7.6	0.430E-01	0.316E-02	-24.7	0.753E-06	0.643E-07	-17.1	4
197.8	4.9	0.0	0.363E-01	0.270E-02	0.0	0.640E-06	0.486E-07	0.0	4
196.6	8.4	-9.9	0.307E-01	0.224E-02	-27.3	0.546E-06	0.460E-07	-17.3	4
195.4	12.3	0.0	0.259E-01	0.195E-02	0.0	0.464E-06	0.452E-07	0.0	4
205.7	13.4	-7.5	0.219E-01	0.153E-02	-30.4	0.374E-06	0.472E-07	-22.0	4
212.6	17.9	0.0	0.187E-01	0.111E-02	0.0	0.310E-06	0.451E-07	0.0	4
209.8	16.5	-8.8	0.159E-01	0.779E-03	-32.7	0.267E-06	0.332E-07	-23.0	4
210.6	14.8	0.0	0.136E-01	0.496E-03	0.0	0.226E-06	0.221E-07	0.0	4
210.4	12.6	-11.5	0.116E-01	0.396E-03	-35.6	0.193E-06	0.140E-07	-24.2	4
215.9	13.7	0.0	0.996E-02	0.367E-03	0.0	0.161E-06	0.103E-07	0.0	4
221.8	11.5	-9.5	0.856E-02	0.322E-03	-38.3	0.134E-06	0.785E-08	-28.7	4
233.5	20.9	0.0	0.739E-02	0.259E-03	0.0	0.111E-06	0.122E-07	0.0	4
242.5	39.3	-4.1	0.642E-02	0.184E-03	-40.3	0.946E-07	0.152E-07	-33.1	4
249.0	48.7	0.0	0.559E-02	0.187E-03	0.0	0.808E-07	0.136E-07	0.0	4
262.2	50.7	0.2	0.490E-02	0.256E-03	-41.8	0.668E-07	0.878E-08	-37.3	4
277.4	51.8	0.0	0.432E-02	0.317E-03	0.0	0.554E-07	0.625E-08	0.0	4
294.7	48.3	5.4	0.384E-02	0.351E-03	-42.5	0.459E-07	0.379E-08	-41.7	4
315.7	42.7	0.0	0.344E-02	0.373E-03	0.0	0.382E-07	0.289E-08	0.0	4
333.5	42.9	12.1	0.310E-02	0.362E-03	-42.3	0.326E-07	0.288E-08	-45.1	4
347.5	48.2	0.0	0.282E-02	0.360E-03	0.0	0.284E-07	0.293E-08	0.0	4
359.8	55.4	14.1	0.256E-02	0.353E-03	-41.6	0.250E-07	0.274E-08	-45.0	4
374.2	63.7	0.0	0.234E-02	0.352E-03	0.0	0.220E-07	0.263E-08	0.0	4
388.4	69.4	0.0	0.215E-02	0.341E-03	0.0	0.195E-07	0.247E-08	0.0	4

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 60 N JANUARY  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

# SEASONAL MEAN PROFILE

## CHURCHILL WINTER

ALTITUDE M NSL	WEST COMPONENT M/SEC	SOUTH COMPONENT M/SEC	SPEED M/SEC	DIRECTION DEGREES	NO OBS	WEST ERROR M/SEC	SOUTH ERROR M/SEC	TEMP ERROR DEGREES	NO OBS
30000	27.7	18.2	31.0	286.7	9	1.5	1.5	0.7	8
35000	43.9	22.7	45.4	284.4	12	1.7	1.6	0.9	11
40000	41.3	36.1	42.2	282.0	27	3.5	3.5	1.3	22
45000	51.9	47.3	52.5	278.1	28	5.7	5.5	1.9	23
50000	56.0	46.4	56.0	270.8	32	8.7	8.5	2.7	27
55000	57.2	47.2	58.2	259.5	30	8.7	8.4	2.6	25
60000	42.3	42.8	43.0	259.3	32	11.3	11.2	3.2	27
65000	35.6	47.6	35.8	263.5	27	11.8	11.7	3.2	22
70000	40.9	41.2	41.0	266.8	30	10.3	10.3	3.6	24
75000	30.5	54.1	31.7	254.1	27	10.4	10.3	3.8	22
80000	27.7	57.1	32.5	238.2	34	25.6	18.2	6.3	29
85000	8.5	64.2	11.5	312.2	39	39.8	39.4	9.2	33
90000	22.3	86.8	25.4	298.5	28	63.5	62.8	14.4	26
95000	34.8	137.8	75.3	332.4	4	83.7	83.4	20.3	4

Table B.3(b).

## SEASONAL MEAN PROFILE

## CHURCHILL SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	MEAN	ST DEV	PCT	DIF	
	DEG K				NT/50 M				KG/CU M				
25000	230.1	0.0	0.8		0.275E 04	0.000E 00	-1.1		0.416E-01	0.000E 00	-2.0		1
26000	230.2	0.0	0.3		0.237E 04	0.000E 00	-1.1		0.358E-01	0.000E 00	-1.4		1
27000	230.2	0.0	-0.3		0.204E 04	0.000E 00	-1.4		0.308E-01	0.000E 00	-1.0		1
28000	229.1	0.0	-1.4		0.176E 04	0.000E 00	-1.5		0.267E-01	0.000E 00	-0.0		1
29000	229.4	0.0	-1.9		0.152E 04	0.000E 00	-1.6		0.230E-01	0.000E 00	0.3		1
30000	229.7	0.0	-2.4		0.131E 04	0.000E 00	-2.0		0.198E-01	0.000E 00	0.3		1
31000	229.2	0.0	-3.2		0.113E 04	0.000E 00	-2.5		0.171E-01	0.000E 00	0.7		1
32000	229.9	0.0	-3.6		0.977E 03	0.000E 00	-2.7		0.148E-01	0.000E 00	0.7		1
33000	231.4	0.0	-4.1		0.844E 03	0.000E 00	-3.3		0.127E-01	0.000E 00	0.8		1
34000	233.0	0.0	-4.5		0.729E 03	0.000E 00	-3.9		0.108E-01	0.000E 00	0.6		1
35000	242.6	5.3	-1.8		0.657E 03	0.210E 02	-0.5		0.944E-02	0.152E-03	1.2		3
36000	246.1	4.4	-1.6		0.569E 03	0.178E 02	-1.3		0.806E-02	0.152E-03	0.2		4
37000	249.8	3.8	-1.3		0.497E 03	0.163E 02	-1.5		0.693E-02	0.151E-03	-0.2		4
38000	253.1	3.8	-1.1		0.434E 03	0.148E 02	-1.6		0.598E-02	0.143E-03	-0.5		4
39000	255.8	7.8	-1.2		0.379E 03	0.107E 02	-1.9		0.517E-02	0.159E-03	-0.7		7
40000	258.6	6.9	-1.3		0.332E 03	0.954E 01	-2.3		0.447E-02	0.109E-03	-1.0		8
41000	261.4	5.8	-1.3		0.294E 03	0.869E 01	-1.8		0.391E-02	0.100E-03	-0.5		11
42000	263.8	5.6	-1.5		0.258E 03	0.810E 01	-2.0		0.341E-02	0.924E-04	-0.5		11
43000	266.0	5.6	-1.8		0.227E 03	0.725E 01	-2.2		0.298E-02	0.853E-04	-0.4		11
44000	267.8	5.9	-1.6		0.200E 03	0.683E 01	-2.5		0.260E-02	0.793E-04	-0.8		11
45000	269.8	5.6	-1.3		0.176E 03	0.616E 01	-2.7		0.228E-02	0.704E-04	-1.3		11
46000	271.2	4.9	-1.2		0.156E 03	0.550E 01	-2.8		0.200E-02	0.643E-04	-1.6		11
47000	272.1	4.7	-1.2		0.137E 03	0.496E 01	-3.0		0.176E-02	0.577E-04	-1.7		11
48000	272.7	4.9	-1.4		0.121E 03	0.449E 01	-3.2		0.155E-02	0.505E-04	-1.8		12
49000	272.7	4.7	-1.6		0.107E 03	0.398E 01	-3.4		0.137E-02	0.454E-04	-1.8		12
50000	272.2	4.5	-1.7		0.951E 02	0.360E 01	-3.6		0.121E-02	0.396E-04	-1.8		12
51000	271.4	4.5	-2.0		0.840E 02	0.328E 01	-3.8		0.107E-02	0.345E-04	-1.8		12
52000	270.4	4.4	-2.4		0.742E 02	0.301E 01	-4.1		0.955E-03	0.294E-04	-1.7		12
53000	269.3	4.5	-2.8		0.655E 02	0.274E 01	-4.4		0.847E-03	0.258E-04	-1.6		12
54000	268.1	4.6	-2.7		0.578E 02	0.251E 01	-4.7		0.750E-03	0.235E-04	-2.0		12
55000	267.0	4.3	-2.4		0.509E 02	0.229E 01	-5.1		0.664E-03	0.225E-04	-2.7		12
56000	265.9	4.3	-2.2		0.449E 02	0.208E 01	-5.4		0.588E-03	0.219E-04	-3.2		12
57000	264.4	4.6	-2.0		0.395E 02	0.187E 01	-5.6		0.521E-03	0.212E-04	-3.6		12
58000	262.4	4.6	-2.0		0.348E 02	0.170E 01	-5.9		0.462E-03	0.197E-04	-3.9		12
59000	259.8	6.1	-2.3		0.306E 02	0.153E 01	-6.1		0.410E-03	0.181E-04	-3.9		12
60000	256.3	6.5	-2.4		0.268E 02	0.138E 01	-6.5		0.365E-03	0.175E-04	-4.1		12
61000	252.7	7.2	-2.0		0.235E 02	0.123E 01	-6.7		0.324E-03	0.167E-04	-4.8		12
62000	248.9	7.8	-1.8		0.206E 02	0.109E 01	-7.0		0.288E-03	0.150E-04	-5.3		12
63000	245.3	7.3	-1.4		0.179E 02	0.995E 00	-7.2		0.255E-03	0.134E-04	-5.9		12
64000	241.9	6.8	-0.9		0.156E 02	0.881E 00	-7.4		0.225E-03	0.119E-04	-6.5		12
65000	238.4	6.5	-0.5		0.136E 02	0.789E 00	-7.5		0.199E-03	0.104E-04	-7.0		12
66000	234.7	6.0	-0.1		0.118E 02	0.710E 00	-7.6		0.175E-03	0.935E-05	-7.4		12
67000	230.3	5.2	-0.0		0.102E 02	0.628E 00	-7.6		0.154E-03	0.843E-05	-7.6		12
68000	225.7	4.5	-0.0		0.884E 01	0.552E 00	-7.6		0.136E-03	0.779E-05	-7.6		12
69000	220.9	3.8	-0.0		0.761E 01	0.489E 00	-7.6		0.120E-03	0.724E-05	-7.5		12
70000	215.4	3.4	-0.5		0.652E 01	0.421E 00	-7.7		0.105E-03	0.642E-05	-7.2		12
71000	209.8	3.6	-0.9		0.557E 01	0.363E 00	-7.8		0.925E-04	0.573E-05	-6.8		12
72000	204.3	4.2	-1.4		0.474E 01	0.315E 00	-8.0		0.808E-04	0.495E-05	-6.6		12
73000	199.4	4.8	-1.6		0.402E 01	0.272E 00	-8.2		0.702E-04	0.435E-05	-6.7		12
74000	194.5	5.6	-1.8		0.339E 01	0.236E 00	-8.5		0.607E-04	0.386E-05	-6.8		12
75000	189.1	6.5	-2.2		0.284E 01	0.205E 00	-8.8		0.524E-04	0.354E-05	-6.7		12
76000	183.7	7.6	-2.7		0.238E 01	0.176E 00	-9.3		0.451E-04	0.326E-05	-6.6		12
77000	178.0	8.6	-3.4		0.197E 01	0.153E 00	-9.9		0.387E-04	0.292E-05	-6.5		12
78000	173.8	7.7	-3.3		0.163E 01	0.133E 00	-10.5		0.328E-04	0.245E-05	-7.3		12
79000	171.5	7.6	-2.1		0.134E 01	0.113E 00	-10.9		0.274E-04	0.219E-05	-8.9		12

80000	169.9	8.5	-0.3	0.110E 01	0.964E-01	-11.1	0.227E-04	0.195E-05	-10.7	12
81000	168.6	9.1	1.5	0.910E 00	0.817E-01	-11.1	0.188E-04	0.170E-05	-12.3	12
82000	167.4	9.5	3.5	0.746E 00	0.693E-01	-10.7	0.155E-04	0.146E-05	-13.5	12
83000	166.7	9.3	1.8	0.610E 00	0.588E-01	-10.2	0.139E-04	0.120E-05	-11.7	12
84000	161.2	9.5	-0.2	0.497E 00	0.502E-01	-10.1	0.107E-04	0.100E-05	-9.7	12
85000	157.7	9.8	-2.4	0.403E 00	0.431E-01	-10.4	0.892E-05	0.856E-06	-8.0	12
86000	153.8	9.0	-4.8	0.325E 00	0.369E-01	-11.1	0.737E-05	0.697E-06	-6.5	12
87000	152.1	7.0	-5.9	0.264E 00	0.317E-01	-11.4	0.605E-05	0.625E-06	-5.8	11
88000	149.4	6.4	-7.5	0.206E 00	0.218E-01	-14.8	0.483E-05	0.547E-06	-7.6	10
89000	150.7	9.1	-6.7	0.186E 00	0.158E-01	-15.9	0.387E-05	0.571E-06	-9.0	8
90000	157.9	15.9	-2.2	0.130E 00	0.886E-02	-18.7	0.292E-05	0.436E-06	-15.7	7
91000	160.9	12.1	0.0	0.106E 00	0.757E-02	0.0	0.231E-05	0.233E-06	0.0	6
92000	164.8	7.6	-1.6	0.869E-01	0.700E-02	-19.1	0.183E-05	0.136E-06	-17.5	5
93000	167.4	0.8	0.0	0.660E-01	0.528E-02	0.0	0.137E-05	0.103E-06	0.0	2
94000	172.9	0.9	-0.5	0.543E-01	0.443E-02	-25.5	0.109E-05	0.834E-07	-24.7	2
95000	180.3	0.0	0.0	0.413E-01	0.400E 00	0.0	0.797E-06	0.000E 00	0.0	1
96000	190.9	0.0	6.2	0.345E-01	0.400E 00	-31.3	0.629E-06	0.000E 00	-34.6	1
97000	199.8	0.0	0.0	0.291E-01	0.400E 00	0.0	0.507E-06	0.000E 00	0.0	1
98000	204.7	0.0	10.5	0.248E-01	0.400E 00	-29.3	0.422E-06	0.000E 00	-34.9	1
99000	208.5	0.0	0.0	0.211E-01	0.400E 00	0.0	0.352E-06	0.000E 00	0.0	1
100000	210.2	0.0	10.3	0.180E-01	0.400E 00	-27.5	0.298E-06	0.000E 00	-32.7	1
101000	212.6	0.0	0.0	0.153E-01	0.400E 00	0.0	0.250E-06	0.000E 00	0.0	1
102000	213.2	0.0	7.0	0.132E-01	0.400E 00	-25.9	0.215E-06	0.000E 00	-28.5	1
103000	214.7	0.0	0.0	0.113E-01	0.400E 00	0.0	0.183E-06	0.000E 00	0.0	1
104000	217.5	0.0	0.1	0.968E-02	0.400E 00	-26.1	0.155E-06	0.000E 00	-23.3	1
105000	219.5	0.0	0.0	0.832E-02	0.400E 00	0.0	0.132E-06	0.000E 00	0.0	1
106000	222.7	0.0	-5.1	0.716E-02	0.400E 00	-27.5	0.112E-06	0.000E 00	-20.1	1
107000	225.4	0.0	0.0	0.619E-02	0.400E 00	0.0	0.956E-07	0.000E 00	0.0	1
108000	229.8	0.0	-9.0	0.535E-02	0.400E 00	-29.9	0.811E-07	0.000E 00	-18.9	1
109000	233.9	0.0	0.0	0.464E-02	0.400E 00	0.0	0.691E-07	0.000E 00	0.0	1
110000	240.0	0.0	-11.1	0.403E-02	0.400E 00	-32.8	0.584E-07	0.000E 00	-20.1	1

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SEASONAL MEAN PROFILE  
CHURCHILL SUMMER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO OBS
	MEAN	ST DEV	MEAN	ST DEV	MEAN	ST DEV	DEGREES	NO OBS	MEAN	ST DEV	MEAN	ST DEV	DEGREES	MEAN ST DEV	
30000	-11.2	0.9	3.9	3.3	11.9	11.9	109.4	2	0.0	0.0	0.0	0.0	1.1	0.0	2
35000	-17.6	13.0	0.0	7.9	17.6	17.6	90.0	5	0.0	0.0	0.0	0.0	1.5	1.4	5
40000	-15.5	12.9	-0.6	7.7	15.5	15.5	87.7	14	0.0	0.0	0.0	0.0	2.3	1.3	14
45000	-16.8	8.3	-4.0	7.3	17.3	17.3	76.5	14	0.0	0.0	0.0	0.0	1.9	1.3	14
50000	-23.4	10.0	-9.6	11.3	25.3	25.3	67.6	13	0.0	0.0	0.0	0.0	1.5	0.8	13
55000	-32.6	15.6	-6.7	14.9	33.3	33.3	78.3	14	0.0	0.0	0.0	0.0	2.1	1.4	16
60000	-24.4	15.2	-0.6	28.6	24.4	24.4	88.5	12	0.0	0.0	0.0	0.0	2.0	1.6	12
65000	-41.3	19.0	4.9	20.1	41.6	41.6	96.7	14	0.0	0.0	0.0	0.0	1.4	1.4	14
70000	-57.0	26.3	-3.6	17.3	57.1	57.1	86.3	17	0.0	0.0	0.0	0.0	1.8	1.5	17
75000	-59.7	44.9	-19.2	62.1	62.7	62.7	72.1	13	0.0	0.0	0.0	0.0	1.9	2.0	13
80000	-17.4	52.9	-15.0	46.1	23.0	23.0	49.2	17	0.0	0.0	0.0	0.0	1.6	2.0	17
85000	20.7	61.5	7.4	48.0	22.0	22.0	250.3	19	0.0	0.0	0.0	0.0	1.7	1.5	19
90000	51.6	60.9	-8.9	101.7	52.4	52.4	279.3	10	0.0	0.0	0.0	0.0	2.4	2.0	10

Table B.3(c).

SEASONAL MEAN PROFILE  
CHURCHILL SPRNG/FALL

ALTITUDE M MSL	**TEMPERATURE**			*****PRESSURE*****			*****DENSITY*****			NO OBS
	MEAN	ST DEV	PCT DIF	MEAN	ST DEV	PCT DIF	MEAN	ST DEV	PCT DIF	
34000	228.0	0.0	-2.4	0.634E 02	0.000E 00	-4.3	0.969E-02	0.000E 00	-1.9	1
35000	231.0	11.1	-2.2	0.562E 03	0.233E 02	-2.1	0.847E-02	0.100E-03	0.1	3
36000	229.4	12.5	-4.1	0.476E 03	0.285E 02	-4.4	0.723E-02	0.135E-03	-0.3	9
37000	233.3	11.6	-3.6	0.412E 03	0.266E 02	-4.7	0.615E-02	0.181E-03	-1.2	9
38000	235.8	11.3	-3.6	0.355E 03	0.231E 02	-5.7	0.524E-02	0.201E-03	-2.2	11
39000	239.2	12.6	-3.3	0.308E 03	0.218E 02	-6.3	0.448E-02	0.221E-03	-3.0	11
40000	242.9	14.5	-2.9	0.267E 03	0.205E 02	-6.8	0.383E-02	0.228E-03	-3.9	11
41000	246.7	16.7	-2.5	0.232E 03	0.194E 02	-7.4	0.328E-02	0.226E-03	-4.9	11
42000	249.2	15.6	-2.6	0.205E 03	0.198E 02	-8.6	0.287E-02	0.205E-03	-4.0	12
43000	250.8	14.3	-2.9	0.177E 03	0.187E 02	-7.9	0.246E-02	0.186E-03	-5.1	13
44000	252.4	13.9	-3.4	0.155E 03	0.173E 02	-8.3	0.214E-02	0.158E-03	-5.2	13
45000	254.3	13.2	-3.7	0.136E 03	0.159E 02	-8.7	0.185E-02	0.141E-03	-5.4	13
46000	256.0	13.0	-4.0	0.119E 03	0.147E 02	-9.1	0.161E-02	0.130E-03	-5.6	13
47000	256.7	12.6	-4.7	0.104E 03	0.135E 02	-9.7	0.141E-02	0.121E-03	-5.5	13
48000	256.9	12.3	-5.0	0.917E 02	0.124E 02	-10.3	0.123E-02	0.114E-03	-5.8	13
49000	256.8	11.8	-5.1	0.805E 02	0.113E 02	-10.8	0.108E-02	0.109E-03	-6.3	13
50000	256.6	11.2	-5.1	0.706E 02	0.103E 02	-11.4	0.956E-03	0.104E-03	-6.8	13
51000	257.2	9.7	-4.9	0.620E 02	0.939E 01	-11.9	0.837E-03	0.992E-04	-7.7	13
52000	257.8	8.3	-4.7	0.544E 02	0.848E 01	-12.5	0.733E-03	0.931E-04	-8.4	13
53000	257.9	7.1	-4.2	0.477E 02	0.762E 01	-13.0	0.643E-03	0.869E-04	-9.3	13
54000	257.1	6.5	-3.9	0.419E 02	0.682E 01	-13.5	0.566E-03	0.805E-04	-10.2	13
55000	255.8	7.2	-3.6	0.367E 02	0.608E 01	-14.0	0.499E-03	0.741E-04	-10.9	13
56000	254.4	8.6	-3.4	0.322E 02	0.541E 01	-14.4	0.440E-03	0.677E-04	-11.4	13
57000	253.1	9.8	-3.2	0.282E 02	0.480E 01	-14.8	0.388E-03	0.616E-04	-11.9	13
58000	251.9	9.4	-3.0	0.247E 02	0.425E 01	-15.2	0.341E-03	0.554E-04	-12.6	13
59000	250.5	9.1	-2.7	0.216E 02	0.375E 01	-15.5	0.300E-03	0.496E-04	-13.1	13
60000	248.2	8.3	-2.9	0.188E 02	0.332E 01	-15.9	0.264E-03	0.435E-04	-13.4	13
61000	245.2	8.6	-3.3	0.164E 02	0.293E 01	-16.3	0.233E-03	0.380E-04	-13.5	13
62000	241.9	9.4	-3.6	0.143E 02	0.259E 01	-16.7	0.206E-03	0.336E-04	-13.7	13
63000	238.5	9.4	-3.4	0.125E 02	0.228E 01	-17.0	0.182E-03	0.303E-04	-14.2	13
64000	236.2	8.9	-2.8	0.108E 02	0.201E 01	-17.3	0.160E-03	0.275E-04	-15.0	13
65000	234.2	8.5	-2.1	0.941E 01	0.176E 01	-17.7	0.140E-03	0.251E-04	-15.9	13
66000	232.4	9.0	-1.2	0.815E 01	0.154E 01	-17.9	0.122E-03	0.227E-04	-16.8	13
67000	230.5	9.4	-0.4	0.705E 01	0.134E 01	-18.0	0.106E-03	0.201E-04	-17.6	13
68000	228.6	8.2	0.5	0.609E 01	0.116E 01	-18.1	0.929E-04	0.175E-04	-18.5	13
69000	226.9	7.5	1.4	0.528E 01	0.100E 01	-18.0	0.807E-04	0.153E-04	-19.2	13
70000	225.1	7.6	2.3	0.453E 01	0.870E 00	-17.8	0.702E-04	0.134E-04	-19.6	13
71000	223.5	8.0	3.0	0.391E 01	0.751E 00	-17.4	0.609E-04	0.118E-04	-19.8	13
72000	222.3	7.5	3.8	0.336E 01	0.646E 00	-17.0	0.527E-04	0.104E-04	-20.0	13
73000	220.7	7.0	4.5	0.289E 01	0.553E 00	-16.6	0.457E-04	0.919E-05	-20.1	13
74000	219.1	7.1	5.2	0.248E 01	0.471E 00	-16.0	0.395E-04	0.808E-05	-20.0	13
75000	217.5	7.3	5.9	0.212E 01	0.398E 00	-15.3	0.342E-04	0.714E-05	-19.8	13
76000	214.8	7.1	6.1	0.182E 01	0.334E 00	-14.6	0.296E-04	0.623E-05	-19.2	13
77000	211.5	8.5	6.0	0.155E 01	0.279E 00	-14.0	0.257E-04	0.544E-05	-18.4	13
78000	208.1	10.3	5.9	0.132E 01	0.231E 00	-13.3	0.223E-04	0.463E-05	-17.6	13
79000	204.5	11.5	5.6	0.112E 01	0.192E 00	-12.6	0.193E-04	0.384E-05	-16.7	13
80000	202.3	11.9	6.1	0.956E 00	0.159E 00	-11.7	0.165E-04	0.323E-05	-16.3	13
81000	201.2	11.7	5.5	0.810E 00	0.132E 00	-10.9	0.141E-04	0.270E-05	-15.1	13
82000	199.6	11.8	4.7	0.685E 00	0.109E 00	-10.2	0.120E-04	0.228E-05	-13.8	13
83000	199.0	12.5	4.4	0.578E 00	0.901E-01	-9.7	0.101E-04	0.195E-05	-12.9	13
84000	197.6	13.6	3.6	0.488E 00	0.738E-01	-9.3	0.867E-05	0.165E-05	-11.8	13
85000	198.1	15.0	3.9	0.422E 00	0.507E-01	-6.7	0.751E-05	0.140E-05	-9.1	12
86000	196.1	17.5	2.9	0.355E 00	0.394E-01	-6.3	0.640E-05	0.117E-05	-7.7	12
87000	194.3	18.5	1.9	0.299E 00	0.306E-01	-6.2	0.544E-05	0.949E-06	-6.7	12
88000	193.0	18.7	1.3	0.251E 00	0.238E-01	-6.2	0.459E-05	0.753E-06	-6.1	12

89000	191.9	18.8	0.7	0.210E 00	0.190E-01	-6.3	0.387E-05	0.593E-06	-5.8	12
90000	193.0	22.6	1.3	0.175E 00	0.129E-01	-7.2	0.321E-05	0.483E-06	-7.0	9
91000	191.7	24.9	0.0	0.150E 00	0.834E-02	0.0	0.276E-05	0.354E-06	0.0	8
92000	186.8	21.4	-2.3	0.124E 00	0.784E-02	-6.8	0.234E-05	0.220E-06	-3.4	7
93000	186.8	19.2	0.0	0.102E 00	0.834E-02	0.0	0.192E-05	0.474E-07	0.0	6
94000	192.4	19.5	-1.2	0.873E-01	0.982E-02	-7.9	0.158E-05	0.479E-07	-6.3	4
95000	188.6	17.2	0.0	0.703E-01	0.870E-02	0.0	0.129E-05	0.659E-07	0.0	3
96000	181.3	9.6	-8.2	0.560E-01	0.839E-02	-17.4	0.107E-05	0.104E-06	-9.4	2

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 MID LAT SPRING/FALL  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

SEASONAL MEAN PROFILE  
CHURCHILL SPRING/FALL

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO OBS
	MEAN	ST DEV	MEAN	ST DEV	M/SEC	MEAN	DEGREES	MEAN	M/SEC	MEAN	ST DEV	M/SEC	MEAN	ST DEV	
30000	-1.0	3.4	-10.5	10.3	10.5	5.5	299.5	3	0.6	0.0	0.6	0.0	0.4	0.1	3
35000	14.4	11.5	-8.1	12.0	16.5	10	2.0	10	2.0	0.9	2.1	1.0	1.0	0.6	9
40000	17.5	18.7	-5.1	20.8	18.2	286.5	13	3.2	1.3	3.3	1.4	5	1.6	1.0	11
45000	29.5	23.3	-1.6	14.0	29.5	273.2	19	4.5	2.1	4.6	2.2	9	2.1	1.3	17
50000	30.4	30.4	-10.2	15.0	32.1	288.6	16	5.9	3.7	6.0	3.8	6	2.3	1.6	14
55000	28.5	31.4	-14.2	18.7	31.9	296.5	20	7.3	3.3	7.3	3.4	8	2.0	1.3	17
60000	25.8	33.7	-0.7	17.1	25.8	271.7	16	7.1	2.6	7.0	2.7	7	1.9	1.6	14
65000	20.0	29.5	1.6	20.6	20.0	265.2	15	9.8	1.2	9.8	1.2	6	1.9	1.4	13
70000	28.9	32.3	5.1	28.2	29.4	259.9	17	11.1	1.7	11.1	1.7	6	2.4	1.3	14
75000	12.3	39.7	8.6	43.9	15.0	234.8	18	10.5	1.8	11.1	1.8	8	2.5	2.1	16
80000	11.1	41.6	2.8	60.2	11.5	255.7	18	16.2	11.3	16.2	11.2	7	4.0	3.3	16
85000	-6.3	45.5	22.1	66.5	22.9	154.0	24	24.7	8.8	25.1	8.8	10	4.2	2.3	21
90000	32.4	44.0	10.0	116.3	33.9	252.7	17	31.0	10.5	34.6	14.6	10	9.6	15.7	16
95000	25.2	69.0	6.9	64.6	26.1	254.5	3	115.9	72.7	111.2	66.1	2	14.7	11.7	3

Table B.4(a).

SEASONAL MEAN PROFILE															
BARROW WINTER															
ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS		
	DEG K				NT/SG M				KG/CU M						
	MEAN	ST	DEV	PCT DIF	MEAN	ST	DEV	PCT DIF	MEAN	ST	DEV	PCT DIF			
33000	241.8	0.6	10.4		0.736E-03	0.261E-02	15.2		0.106E-01	0.348E-03		4.3	2		
34000	230.3	14.4	4.7		0.599E-03	0.469E-02	9.3		0.905E-02	0.292E-03		4.3	3		
35000	228.1	15.3	2.6		0.504E-03	0.434E-02	7.2		0.769E-02	0.282E-03		4.4	9		
36000	228.5	13.6	1.6		0.437E-03	0.386E-02	8.2		0.666E-02	0.301E-03		6.3	15		
37000	229.7	14.7	1.1		0.380E-03	0.366E-02	9.2		0.575E-02	0.278E-03		7.9	16		
38000	229.6	15.5	-0.0		0.328E-03	0.347E-02	9.4		0.497E-02	0.267E-03		9.2	16		
39000	229.7	16.4	-1.0		0.283E-03	0.325E-02	9.4		0.429E-02	0.253E-03		10.2	16		
40000	230.1	17.3	-1.8		0.245E-03	0.305E-02	9.2		0.369E-02	0.245E-03		11.0	16		
41000	232.7	19.1	-1.8		0.214E-03	0.287E-02	10.0		0.319E-02	0.230E-03		11.7	17		
42000	234.1	17.5	-2.2		0.188E-03	0.269E-02	11.6		0.279E-02	0.230E-03		13.8	19		
43000	235.2	16.7	-2.8		0.163E-03	0.247E-02	11.3		0.240E-02	0.243E-03		14.0	19		
44000	236.3	15.8	-3.3		0.141E-03	0.225E-02	10.9		0.207E-02	0.234E-03		14.2	19		
45000	237.2	15.3	-3.9		0.123E-03	0.205E-02	10.5		0.179E-02	0.222E-03		14.6	19		
46000	237.7	14.7	-4.6		0.106E-03	0.186E-02	9.9		0.155E-02	0.206E-03		14.7	19		
47000	238.6	14.3	-5.2		0.928E-02	0.168E-02	9.3		0.134E-02	0.190E-03		14.8	19		
48000	238.9	13.9	-6.0		0.806E-02	0.151E-02	8.5		0.117E-02	0.175E-03		15.0	19		
49000	239.2	14.0	-6.8		0.701E-02	0.135E-02	7.6		0.101E-02	0.161E-03		15.0	19		
50000	239.1	12.6	-7.7		0.609E-02	0.121E-02	6.6		0.884E-03	0.145E-03		15.0	19		
51000	239.1	11.1	-8.0		0.530E-02	0.108E-02	5.5		0.768E-03	0.132E-03		14.2	19		
52000	239.1	10.2	-8.0		0.461E-02	0.964E-01	4.4		0.668E-03	0.121E-03		13.1	19		
53000	239.4	9.9	-7.9		0.400E-02	0.852E-01	3.3		0.581E-03	0.110E-03		11.8	19		
54000	239.3	7.5	-7.9		0.348E-02	0.747E-01	2.2		0.506E-03	0.103E-03		10.9	19		
55000	239.4	8.7	-7.5		0.303E-02	0.652E-01	1.2		0.442E-03	0.967E-04		9.7	19		
56000	239.8	12.0	-6.7		0.263E-02	0.564E-01	0.1		0.384E-03	0.899E-04		8.1	19		
57000	240.6	12.9	-5.8		0.228E-02	0.483E-01	-0.8		0.333E-03	0.799E-04		6.2	19		
58000	241.3	12.1	-4.9		0.198E-02	0.413E-01	-1.6		0.289E-03	0.684E-04		4.3	19		
59000	241.1	11.9	-4.2		0.172E-02	0.353E-01	-2.4		0.251E-03	0.588E-04		2.8	19		
60000	239.4	12.4	-4.5		0.148E-02	0.301E-01	-4.0		0.218E-03	0.517E-04		1.4	18		
61000	237.8	13.4	-5.0		0.128E-02	0.255E-01	-4.8		0.190E-03	0.448E-04		1.2	18		
62000	236.3	15.0	-5.4		0.111E-02	0.216E-01	-5.6		0.166E-03	0.386E-04		0.8	18		
63000	234.9	14.8	-5.8		0.967E-01	0.183E-01	-6.4		0.145E-03	0.329E-04		0.3	18		
64000	233.1	12.9	-6.3		0.838E-01	0.155E-01	-7.3		0.126E-03	0.277E-04		-0.2	18		
65000	231.9	11.3	-6.6		0.725E-01	0.131E-01	-8.3		0.109E-03	0.233E-04		-1.0	18		
66000	229.9	10.9	-7.2		0.626E-01	0.111E-01	-9.2		0.955E-04	0.198E-04		-1.5	18		
67000	228.2	11.1	-8.4		0.540E-01	0.940E-00	-10.3		0.830E-04	0.168E-04		-2.2	18		
68000	225.7	11.1	-8.4		0.466E-01	0.793E-00	-11.5		0.723E-04	0.143E-04		-2.7	18		
69000	222.7	11.3	-9.6		0.401E-01	0.665E-00	-12.8		0.631E-04	0.124E-04		-2.8	18		
70000	219.6	12.1	-10.4		0.344E-01	0.554E-00	-14.2		0.551E-04	0.110E-04		-3.3	18		
71000	217.0	13.2	-10.7		0.295E-01	0.459E-00	-15.7		0.478E-04	0.973E-05		-4.5	18		
72000	215.0	14.4	-10.8		0.252E-01	0.375E-00	-17.2		0.414E-04	0.848E-05		-6.0	18		
73000	213.5	15.0	-10.5		0.215E-01	0.302E-00	-18.7		0.355E-04	0.718E-05		-7.8	18		
74000	212.4	14.5	-10.2		0.184E-01	0.241E-00	-20.1		0.305E-04	0.586E-05		-9.9	18		
75000	211.5	14.4	-9.8		0.157E-01	0.192E-00	-21.4		0.261E-04	0.475E-05		-11.9	18		
76000	211.4	15.4	-9.0		0.134E-01	0.153E-00	-22.7		0.223E-04	0.388E-05		-14.0	18		
77000	213.8	16.7	-7.1		0.114E-01	0.121E-00	-23.6		0.188E-04	0.321E-05		-16.8	18		
78000	217.4	18.9	-4.7		0.979E-00	0.955E-01	-24.5		0.158E-04	0.266E-05		-19.7	18		
79000	221.3	22.6	-2.0		0.859E-00	0.754E-01	-25.1		0.135E-04	0.230E-05		-22.4	18		
80000	221.8	22.0	-0.9		0.714E-00	0.558E-01	-26.0		0.113E-04	0.178E-05		-24.3	17		
81000	219.6	21.0	-0.9		0.613E-00	0.446E-01	-26.2		0.984E-05	0.139E-05		-24.6	17		
82000	218.7	20.8	-0.4		0.525E-00	0.364E-01	-26.5		0.846E-05	0.109E-05		-25.3	17		
83000	218.7	22.5	0.6		0.450E-00	0.304E-01	-26.6		0.726E-05	0.948E-06		-26.1	17		
84000	221.6	21.9	2.9		0.386E-00	0.262E-01	-26.5		0.613E-05	0.731E-06		-27.9	17		
85000	224.1	22.5	5.1		0.332E-00	0.224E-01	-26.2		0.524E-05	0.631E-06		-29.1	17		
86000	223.7	21.1	-6.0		0.286E-00	0.194E-01	-25.7		0.444E-05	0.518E-06		-29.2	17		
87000	224.4	22.5	7.4		0.246E-00	0.171E-01	-25.0		0.385E-05	0.460E-06		-29.5	17		

88000	224.1	18.5	8.4	0.213E 00	0.145E-01	-23.8	0.333E-05	0.345E-06	-29.3	16
89000	220.5	18.6	7.8	0.185E 00	0.107E-01	-22.2	0.294E-05	0.289E-06	-27.4	15
90000	214.7	20.1	6.1	0.158E 00	0.927E-02	-21.5	0.259E-05	0.254E-06	-25.4	15
91000	207.3	17.0	0.0	0.136E 00	0.847E-02	0.0	0.230E-05	0.216E-06	0.0	13
92000	206.0	22.1	0.2	0.116E 00	0.773E-02	-20.4	0.198E-05	0.236E-06	-19.5	10
93000	201.9	17.5	0.0	0.983E-01	0.694E-02	0.0	0.170E-05	0.180E-06	0.0	8
94000	202.9	10.9	-3.1	0.842E-01	0.671E-02	-20.6	0.144E-05	0.102E-06	-17.6	6
95000	206.5	7.2	0.0	0.684E-01	0.660E-02	0.0	0.115E-05	0.102E-06	0.0	3
96000	238.2	0.0	12.0	0.600E-01	0.600E 00	-22.6	0.877E-06	0.000E 00	-30.3	1
97000	279.0	0.0	0.0	0.528E-01	0.000E 00	0.0	0.659E-06	0.000E 00	0.0	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 60 N JANUARY  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

# SEASONAL MEAN PROFILE

BARROW WINTER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO	
	MEAN	ST DEV	MEAN	ST DEV	M/SEC	M/SEC	DEGREES	OBS	MEAN	ST DEV	M/SEC	M/SEC	DEGREES	ST DEV	OBS	OBS
30000	38.5	19.7	-28.9	18.4	48.2	48.2	306.8	9	2.6	0.9	2.6	0.9	0.6	0.1	9	9
35000	33.6	22.5	-41.1	19.4	53.1	53.1	320.7	14	3.4	2.3	3.5	2.4	1.0	0.4	13	13
40000	34.6	22.5	-47.0	22.2	58.4	58.4	323.6	21	4.3	0.7	4.4	0.7	1.9	0.9	20	20
45000	32.0	28.8	-50.9	36.3	60.2	60.2	327.8	28	6.6	2.2	6.8	2.4	2.6	1.0	26	26
50000	19.5	24.9	-47.2	40.7	51.1	51.1	337.5	23	7.2	2.8	7.4	2.9	3.3	1.3	22	22
55000	10.1	37.6	-45.3	39.7	46.4	46.4	347.3	27	6.3	1.4	6.9	1.3	3.7	1.3	25	25
60000	6.4	25.4	-24.4	39.3	25.3	25.3	345.1	23	8.4	3.2	8.8	3.5	4.3	1.8	23	23
65000	16.7	21.7	-33.5	42.1	37.4	37.4	333.4	20	11.3	3.6	11.8	3.8	5.3	1.8	20	20
70000	-0.9	24.6	-29.9	51.2	29.9	29.9	1.8	24	14.2	7.0	14.9	7.0	6.0	2.9	24	24
75000	9.1	46.4	5.1	37.6	10.4	10.4	240.4	24	15.5	7.7	16.0	8.0	6.5	2.8	24	24
80000	14.8	65.1	14.2	48.0	20.6	20.6	226.1	28	30.5	12.1	30.1	12.2	11.0	5.1	28	28
85000	17.5	81.7	-3.6	64.6	17.8	17.8	281.6	31	34.8	15.8	35.8	15.9	13.9	7.1	31	31
90000	-14.1	75.1	40.1	124.0	42.5	42.5	160.6	21	52.0	33.4	52.3	33.8	18.2	11.4	21	21
95000	82.8	94.5	-59.7	143.8	102.1	102.1	305.8	4	50.8	0.0	47.4	0.0	17.3	8.3	4	4

Table B.4(b).

## SEASONAL MEAN PROFILE

BARROW SUMMER

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	NT/50 M	PCT	DIF	MEAN	KG/CU M	ST DEV	PCT	
25000	228.6	1.5	0.2	0.2	0.271E 04	0.200E 02	-2.5	0.413E-01	0.593E-03	-2.7	2		
26000	229.9	0.3	0.1	0.1	0.234E 04	0.200E 02	-2.4	0.354E-01	0.364E-03	-2.5	2		
27000	231.4	0.4	0.1	0.1	0.201E 04	0.150E 02	-2.6	0.303E-01	0.134E-03	-2.7	2		
28000	233.3	0.8	0.3	0.3	0.174E 04	0.150E 02	-2.4	0.260E-01	0.166E-03	-2.7	2		
29000	234.2	0.8	0.0	0.0	0.150E 04	0.150E 02	-2.6	0.223E-01	0.146E-03	-2.7	2		
30000	236.4	2.0	0.3	0.3	0.131E 04	0.100E 02	-2.0	0.193E-01	0.241E-04	-2.4	2		
31000	237.5	1.7	0.2	0.2	0.113E 04	0.150E 02	-2.0	0.166E-01	0.373E-04	-2.3	2		
32000	236.6	0.6	-0.7	-0.7	0.984E 03	0.110E 02	-2.0	0.144E-01	0.204E-03	-1.3	2		
33000	234.9	0.2	-2.6	-2.6	0.852E 03	0.850E 01	-2.3	0.126E-01	0.142E-03	0.3	2		
34000	235.1	0.7	-3.7	-3.7	0.739E 03	0.800E 01	-2.6	0.109E-01	0.155E-03	1.1	2		
35000	235.9	0.2	-4.5	-4.5	0.640E 03	0.700E 01	-3.2	0.945E-02	0.115E-03	1.3	2		
36000	244.9	6.1	-2.0	-2.0	0.551E 03	0.928E 01	-4.4	0.784E-02	0.242E-03	-2.3	5		
37000	250.0	5.5	-1.2	-1.2	0.486E 03	0.137E 02	-3.6	0.677E-02	0.176E-03	-2.4	6		
38000	253.9	4.4	-0.8	-0.8	0.425E 03	0.126E 02	-3.7	0.583E-02	0.134E-03	-2.9	6		
39000	257.2	4.2	-0.7	-0.7	0.372E 03	0.115E 02	-3.8	0.505E-02	0.116E-03	-3.1	6		
40000	261.5	3.2	-0.2	-0.2	0.327E 03	0.105E 02	-3.8	0.436E-02	0.108E-03	-3.6	6		
41000	266.0	2.7	0.3	0.3	0.288E 03	0.960E 01	-3.7	0.377E-02	0.109E-03	-4.1	6		
42000	269.6	3.7	0.6	0.6	0.254E 03	0.863E 01	-3.6	0.328E-02	0.106E-03	-4.2	6		
43000	272.8	5.1	0.6	0.6	0.224E 03	0.797E 01	-3.6	0.286E-02	0.961E-04	-4.3	6		
44000	276.0	6.4	1.2	1.2	0.198E 03	0.726E 01	-3.5	0.250E-02	0.852E-04	-4.7	6		
45000	277.4	7.3	1.4	1.4	0.176E 03	0.610E 01	-3.0	0.221E-02	0.696E-04	-4.4	7		
46000	277.7	6.9	1.1	1.1	0.157E 03	0.608E 01	-2.0	0.197E-02	0.793E-04	-3.1	9		
47000	278.0	6.4	0.8	0.8	0.138E 03	0.621E 01	-2.6	0.173E-02	0.748E-04	-3.4	10		
48000	278.3	5.9	0.5	0.5	0.122E 03	0.557E 01	-2.4	0.153E-02	0.641E-04	-2.9	10		
49000	278.4	5.3	0.4	0.4	0.108E 03	0.502E 01	-2.3	0.136E-02	0.559E-04	-2.8	10		
50000	278.7	4.2	0.5	0.5	0.965E 02	0.457E 01	-2.2	0.120E-02	0.510E-04	-2.8	10		
51000	279.1	3.5	0.6	0.6	0.855E 02	0.411E 01	-2.0	0.106E-02	0.465E-04	-2.8	10		
52000	279.4	3.5	0.8	0.8	0.759E 02	0.370E 01	-1.9	0.946E-03	0.426E-04	-2.7	10		
53000	278.9	3.4	0.6	0.6	0.673E 02	0.333E 01	-1.8	0.840E-03	0.379E-04	-2.4	10		
54000	277.6	3.3	0.6	0.6	0.596E 02	0.299E 01	-1.7	0.748E-03	0.328E-04	-2.3	10		
55000	276.2	3.6	0.8	0.8	0.528E 02	0.271E 01	-1.5	0.666E-03	0.294E-04	-2.4	10		
56000	275.0	3.6	1.1	1.1	0.468E 02	0.244E 01	-1.4	0.592E-03	0.262E-04	-2.5	10		
57000	273.1	3.5	1.1	1.1	0.414E 02	0.221E 01	-1.2	0.528E-03	0.237E-04	-2.4	10		
58000	270.5	2.6	0.9	0.9	0.366E 02	0.199E 01	-1.0	0.471E-03	0.222E-04	-2.0	10		
59000	267.5	2.1	0.5	0.5	0.323E 02	0.178E 01	-0.9	0.421E-03	0.207E-04	-1.4	10		
60000	264.5	2.3	0.7	0.7	0.285E 02	0.159E 01	-0.8	0.375E-03	0.199E-04	-1.5	10		
61000	261.2	2.2	1.2	1.2	0.251E 02	0.141E 01	-0.7	0.334E-03	0.180E-04	-1.9	10		
62000	257.7	2.4	1.6	1.6	0.220E 02	0.125E 01	-0.4	0.298E-03	0.161E-04	-2.0	10		
63000	254.2	2.7	2.1	2.1	0.193E 02	0.111E 01	-0.1	0.265E-03	0.143E-04	-2.2	10		
64000	250.8	3.3	2.6	2.6	0.169E 02	0.987E 00	0.1	0.235E-03	0.125E-04	-2.4	10		
65000	246.6	3.3	2.9	2.9	0.148E 02	0.877E 00	0.6	0.209E-03	0.111E-04	-2.2	10		
66000	242.5	3.2	3.2	3.2	0.129E 02	0.774E 00	1.1	0.185E-03	0.100E-04	-2.0	10		
67000	237.9	3.8	3.2	3.2	0.112E 02	0.686E 00	1.6	0.165E-03	0.908E-05	-1.5	10		
68000	233.4	4.7	3.3	3.3	0.078E 01	0.608E 00	2.2	0.146E-03	0.815E-05	-1.1	10		
69000	228.9	5.7	3.5	3.5	0.047E 01	0.538E 00	2.7	0.128E-03	0.739E-05	-0.7	10		
70000	223.7	5.6	3.2	3.2	0.031E 01	0.476E 00	3.3	0.113E-03	0.679E-05	0.0	10		
71000	217.6	5.2	2.6	2.6	0.029E 01	0.441E 00	3.9	0.100E-03	0.637E-05	1.2	9		
72000	212.4	4.8	2.4	2.4	0.038E 01	0.387E 00	4.4	0.883E-04	0.572E-05	1.9	9		
73000	207.0	4.5	2.0	2.0	0.059E 01	0.338E 00	4.8	0.773E-04	0.512E-05	2.7	9		
74000	201.3	4.1	1.5	1.5	0.050E 01	0.299E 00	5.2	0.675E-04	0.457E-05	3.6	9		
75000	195.5	3.8	0.9	0.9	0.030E 01	0.253E 00	5.5	0.588E-04	0.410E-05	4.5	9		
76000	189.7	3.4	0.4	0.4	0.027E 01	0.217E 00	5.7	0.509E-04	0.370E-05	5.2	9		
77000	183.9	2.9	-0.2	-0.2	0.032E 01	0.184E 00	5.8	0.440E-04	0.331E-05	6.0	9		
78000	178.3	3.1	-0.8	-0.8	0.019E 01	0.159E 00	5.7	0.377E-04	0.294E-05	6.6	9		
79000	172.4	3.1	-1.5	-1.5	0.015E 01	0.105E 00	3.7	0.317E-04	0.198E-05	5.3	8		

80000	166.4	3.4	-2.4	0.129E 01	0.873E-01	3.3	0.270E-04	0.170E-05	5.8	8
81000	159.9	3.3	-3.6	0.105E 01	0.746E-01	2.8	0.229E-04	0.153E-05	6.7	8
82000	153.7	3.5	-4.9	0.853E 00	0.608E-01	2.0	0.193E-04	0.141E-05	7.4	8
83000	148.4	5.0	-8.1	0.694E 00	0.486E-01	0.6	0.160E-04	0.130E-05	9.8	8
84000	144.4	5.9	-10.6	0.545E 00	0.378E-01	-1.4	0.131E-04	0.117E-05	10.6	8
85000	141.9	6.3	-12.1	0.432E 00	0.287E-01	-4.0	0.106E-04	0.941E-06	9.6	8
86000	141.6	6.2	-12.3	0.341E 00	0.219E-01	-6.7	0.842E-05	0.707E-06	6.7	8
87000	142.3	6.4	-11.9	0.270E 00	0.168E-01	-9.3	0.563E-05	0.526E-06	3.1	8
88000	143.3	6.9	-11.3	0.214E 00	0.134E-01	-11.7	0.522E-05	0.409E-06	-0.2	8
89000	143.5	7.5	-10.9	0.170E 00	0.107E-01	-14.0	0.412E-05	0.327E-06	-3.1	8
90000	145.7	10.4	-9.8	0.136E 00	0.900E-02	-16.4	0.323E-05	0.337E-06	-6.7	7
91000	146.3	13.4	0.0	0.106E 00	0.766E-02	0.0	0.253E-05	0.281E-06	0.0	6
92000	154.3	18.3	-7.8	0.857E-01	0.670E-02	-20.1	0.195E-05	0.232E-06	-12.0	6
93000	161.9	29.8	0.0	0.658E-01	0.433E-02	0.3	0.145E-05	0.211E-06	0.0	3
94000	160.0	38.6	-7.9	0.510E-01	0.532E-02	-30.0	0.115E-05	0.162E-06	-20.8	2
95000	167.4	42.8	0.0	0.414E-01	0.650E-02	0.0	0.885E-06	0.911E-07	0.0	2
96000	127.9	0.0	-28.7	0.269E-01	0.000E 00	-46.4	0.732E-06	0.000E 00	-23.9	1

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 60 N JULY  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

# SEASONAL MEAN PROFILE

## BARROW SUMMER

ALTITUDE M MSL	WEST COMPONENT		SOUTH COMPONENT		SPEED		DIRECTION		WEST ERROR		SOUTH ERROR		TEMP ERROR		NO OBS
	MEAN	ST DEV	MEAN	ST DEV	M/SEC	MEAN	DEGREES	NO OBS	M/SEC	MEAN ST DEV	M/SEC	MEAN ST DEV	DEGREES	MEAN ST DEV	
35000	-6.2	5.3	2.6	2.6	6.7	6.7	113.2	4	0.0	0.0	0.0	0.0	0.2	0.1	4
40000	-6.8	8.3	0.1	3.2	6.8	6.8	91.5	5	0.0	0.0	0.0	0.0	0.6	0.4	5
45000	-12.8	5.2	-2.5	4.3	13.1	13.1	78.8	11	0.0	0.0	0.0	0.0	0.9	0.6	11
50000	-14.5	6.4	-6.0	7.1	15.7	15.7	67.3	11	0.0	0.0	0.0	0.0	1.5	0.9	11
55000	-16.3	9.7	-1.6	5.6	16.4	16.4	54.1	9	0.0	0.0	0.0	0.0	1.4	0.8	9
60000	-25.1	7.1	-4.5	14.3	25.5	25.5	79.2	10	0.0	0.0	0.0	0.0	1.2	0.8	10
65000	-22.2	10.0	-4.2	8.8	22.5	22.5	79.2	7	0.0	0.0	0.0	0.0	1.2	0.8	7
70000	-34.8	8.7	-0.7	12.7	34.8	34.8	88.8	8	0.0	0.0	0.0	0.0	1.4	0.6	8
75000	-38.9	21.3	-11.2	24.6	40.5	40.5	73.8	9	0.0	0.0	0.0	0.0	1.4	0.9	9
80000	-46.2	34.6	-20.9	34.0	50.7	50.7	65.6	10	0.0	0.0	0.0	0.0	1.8	0.6	10
85000	-17.0	47.7	15.5	45.7	23.1	23.1	132.3	10	0.0	0.0	0.0	0.0	2.6	1.4	10
90000	-17.5	88.9	4.2	47.7	18.0	18.0	103.5	7	0.0	0.0	0.0	0.0	7.7	5.5	7
95000	-27.8	16.5	0.4	6.9	27.8	27.8	90.8	2	0.0	0.0	0.0	0.0	5.3	0.0	2

Table B.4(c).

SEASONAL MEAN PROFILE  
BARROW SPRING/FALL

ALTITUDE M MSL	**TEMPERATURE**				*****PRESSURE*****				*****DENSITY*****				NO OBS
	MEAN	ST DEV	PCT	DIF	MEAN	NT/SQ M	PCT	DIF	MEAN	KG/CU M	ST DEV	PCT	
34000	225.3	5.3	-3.5	0.594E 03	0.184E 02	-10.4	0.919E-02	0.460E-03	-7.0	3			
35000	233.5	10.0	-1.2	0.529E 03	0.453E 02	-7.8	0.789E-02	0.632E-03	-6.6	11			
36000	235.7	9.8	-1.4	0.468E 03	0.475E 02	-5.9	0.692E-02	0.580E-03	-4.6	14			
37000	239.5	11.0	-1.0	0.410E 03	0.418E 02	-5.3	0.595E-02	0.465E-03	-4.4	17			
38000	241.2	11.0	-1.4	0.380E 03	0.380E 02	-5.4	0.513E-02	0.404E-03	-4.2	17			
39000	243.1	10.8	-1.8	0.310E 03	0.345E 02	-5.6	0.443E-02	0.358E-03	-4.0	17			
40000	244.9	10.7	-2.1	0.270E 03	0.314E 02	-5.8	0.383E-02	0.323E-03	-4.0	17			
41000	246.9	10.4	-2.4	0.235E 03	0.288E 02	-6.1	0.331E-02	0.294E-03	-4.1	17			
42000	248.7	10.9	-2.8	0.205E 03	0.262E 02	-6.4	0.287E-02	0.266E-03	-4.0	17			
43000	250.5	12.5	-3.0	0.179E 03	0.239E 02	-6.8	0.249E-02	0.242E-03	-4.1	17			
44000	252.4	14.7	-3.4	0.157E 03	0.218E 02	-7.1	0.216E-02	0.221E-03	-4.1	17			
45000	254.1	16.1	-3.7	0.137E 03	0.200E 02	-7.5	0.188E-02	0.196E-03	-4.1	17			
46000	256.5	14.1	-3.8	0.120E 03	0.183E 02	-7.9	0.163E-02	0.174E-03	-4.6	17			
47000	258.6	12.7	-4.1	0.106E 03	0.167E 02	-8.3	0.142E-02	0.162E-03	-4.8	17			
48000	260.3	12.2	-3.8	0.933E 02	0.152E 02	-8.7	0.124E-02	0.152E-03	-5.5	17			
49000	260.8	12.5	-3.6	0.821E 02	0.139E 02	-9.1	0.109E-02	0.138E-03	-6.1	17			
50000	260.7	12.5	-3.9	0.722E 02	0.126E 02	-9.4	0.959E-03	0.126E-03	-6.5	17			
51000	260.0	12.3	-3.9	0.635E 02	0.115E 02	-9.8	0.846E-03	0.116E-03	-6.6	17			
52000	258.9	12.2	-4.3	0.558E 02	0.104E 02	-10.2	0.747E-03	0.107E-03	-6.7	17			
53000	257.8	11.9	-4.3	0.490E 02	0.945E 01	-10.6	0.659E-03	0.100E-03	-7.1	17			
54000	256.8	11.8	-4.0	0.431E 02	0.853E 01	-11.0	0.581E-03	0.924E-04	-7.9	17			
55000	256.6	10.3	-3.3	0.378E 02	0.770E 01	-11.4	0.511E-03	0.856E-04	-8.8	17			
56000	256.7	8.8	-2.6	0.332E 02	0.691E 01	-11.7	0.448E-03	0.796E-04	-9.7	17			
57000	256.7	8.2	-1.8	0.292E 02	0.618E 01	-11.8	0.394E-03	0.737E-04	-10.5	17			
58000	256.1	9.1	-1.3	0.256E 02	0.553E 01	-12.0	0.347E-03	0.676E-04	-11.1	17			
59000	253.4	8.0	-1.6	0.224E 02	0.493E 01	-12.2	0.307E-03	0.602E-04	-11.1	17			
60000	250.1	7.6	-2.1	0.196E 02	0.439E 01	-12.3	0.272E-03	0.533E-04	-10.8	17			
61000	246.2	8.5	-2.9	0.172E 02	0.390E 01	-12.5	0.242E-03	0.479E-04	-10.3	17			
62000	243.7	6.9	-2.9	0.152E 02	0.346E 01	-11.6	0.216E-03	0.438E-04	-9.4	16			
63000	239.9	6.8	-2.8	0.132E 02	0.306E 01	-11.9	0.191E-03	0.395E-04	-9.7	16			
64000	236.3	7.4	-2.8	0.115E 02	0.271E 01	-12.2	0.169E-03	0.353E-04	-10.1	16			
65000	233.3	8.2	-2.4	0.100E 02	0.239E 01	-12.4	0.148E-03	0.317E-04	-10.6	16			
66000	230.9	8.3	-1.8	0.868E 01	0.210E 01	-12.6	0.130E-03	0.285E-04	-11.3	16			
67000	228.6	7.6	-1.1	0.751E 01	0.184E 01	-12.7	0.113E-03	0.257E-04	-12.0	16			
68000	226.6	7.6	-0.3	0.649E 01	0.161E 01	-12.7	0.995E-04	0.232E-04	-12.6	16			
69000	224.7	8.1	0.5	0.560E 01	0.140E 01	-12.6	0.867E-04	0.206E-04	-13.2	16			
70000	223.1	8.7	1.4	0.483E 01	0.122E 01	-12.4	0.752E-04	0.182E-04	-13.8	16			
71000	220.9	9.9	1.8	0.415E 01	0.106E 01	-12.2	0.654E-04	0.161E-04	-13.8	16			
72000	218.3	12.0	1.9	0.357E 01	0.921E 00	-11.9	0.570E-04	0.142E-04	-13.6	16			
73000	214.9	12.1	1.8	0.306E 01	0.797E 00	-11.6	0.496E-04	0.126E-04	-13.2	16			
74000	212.3	10.4	1.9	0.261E 01	0.685E 00	-11.4	0.430E-04	0.113E-04	-13.0	16			
75000	210.5	11.5	2.5	0.223E 01	0.584E 00	-11.1	0.371E-04	0.101E-04	-12.9	16			
76000	209.4	13.5	3.5	0.190E 01	0.494E 00	-10.7	0.320E-04	0.911E-05	-12.9	16			
77000	207.8	13.6	4.2	0.162E 01	0.413E 00	-10.2	0.275E-04	0.805E-05	-12.8	16			
78000	205.3	12.9	4.4	0.137E 01	0.343E 00	-9.8	0.237E-04	0.699E-05	-12.5	16			
79000	201.7	12.3	3.8	0.116E 01	0.282E 00	-9.3	0.204E-04	0.595E-05	-11.7	16			
80000	198.0	12.6	3.2	0.986E 00	0.230E 00	-8.9	0.176E-04	0.507E-05	-10.9	16			
81000	194.7	14.7	2.1	0.830E 00	0.185E 00	-8.6	0.151E-04	0.433E-05	-8.9	16			
82000	193.1	17.1	1.3	0.697E 00	0.148E 00	-8.6	0.128E-04	0.367E-05	-7.9	16			
83000	190.2	16.5	-0.2	0.589E 00	0.121E 00	-8.0	0.110E-04	0.295E-05	-6.1	15			
84000	189.8	15.2	-0.3	0.493E 00	0.970E-01	-8.4	0.920E-05	0.233E-05	-6.5	15			
85000	192.2	18.1	0.8	0.408E 00	0.777E-01	-9.3	0.753E-05	0.188E-05	-8.9	14			
86000	198.0	24.9	3.9	0.337E 00	0.615E-01	-11.1	0.609E-05	0.161E-05	-12.2	13			
87000	199.9	26.0	4.9	0.289E 00	0.664E-01	-9.2	0.520E-05	0.137E-05	-10.6	12			
88000	199.5	26.5	4.7	0.243E 00	0.635E-01	-9.1	0.438E-05	0.110E-05	-10.4	12			

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
80000	197.4	24.0	3.6	0.205E 00	0.287E-01	-8.9	0.370E-05	0.843E-06	-9.8
90000	194.5	26.4	2.1	0.173E 00	0.231E-01	-8.1	0.319E-05	0.675E-06	-7.7
91000	191.9	26.3	0.0	0.145E 00	0.186E-01	0.0	0.269E-05	0.531E-06	0.0
92000	179.9	18.8	-5.9	0.122E 00	0.159E-01	-7.9	0.240E-05	0.398E-06	-0.6
93000	173.4	13.5	0.0	0.104E 00	0.132E-01	0.0	0.212E-05	0.350E-06	0.0
94000	161.6	2.5	-17.0	0.889E-01	0.892E-02	-6.2	0.192E-05	0.215E-06	13.8

PERCENT DIFFERENCES WERE CALCULATED USING U.S. STANDARD ATMOSPHERE SUPPLEMENTS, 1966 MID LAT SPRING/FALL  
STANDARD ATMOSPHERE ABOVE 90 KM IS AVAILABLE FOR EVEN KILOMETER LEVELS ONLY

## SEASONAL MEAN PROFILE

## BARROW SPRING/FALL

ALTITUDE M MSL	WEST COMPONENT M/SEC MEAN ST DEV	SOUTH COMPONENT M/SEC MEAN ST DEV	SPEED M/SEC MEAN	DIRECTION DEGREES MEAN	NO OBS	WEST ERROR M/SEC MEAN ST DEV	SOUTH ERROR M/SEC MEAN ST DEV	TEMP ERROR DEGREES MEAN ST DEV	NO OBS
30000	21.3	21.8	21.7	259.6	11	2.3	0.9	0.7	0.5
35000	16.7	22.8	16.7	271.9	11	3.4	2.0	0.9	0.6
40000	13.9	23.0	13.9	271.8	23	2.9	1.3	1.3	0.9
45000	16.0	24.9	16.0	269.0	21	5.2	2.1	2.3	1.4
50000	18.9	27.0	19.0	274.6	27	5.8	2.3	3.3	3.6
55000	11.7	34.1	12.1	284.6	22	5.7	1.9	3.5	5.0
60000	-1.6	31.1	1.9	121.3	24	8.9	1.5	3.7	2.8
65000	-2.2	28.9	3.7	36.0	22	9.8	1.7	3.2	1.7
70000	0.8	27.0	3.1	343.4	20	11.4	2.4	3.7	1.9
75000	3.0	29.5	3.3	295.7	24	24.0	12.0	6.8	4.8
80000	-13.3	40.0	13.5	99.2	26	41.2	24.0	8.4	6.5
85000	21.3	69.9	25.8	235.7	27	73.8	69.6	15.4	18.2
90000	-3.3	71.7	3.3	82.1	20	108.8	127.9	16.7	23.9



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